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THE NEW YORK BOTANICAL GARDEN

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THE NEW YORK BOTANICAL GARDEN

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DOROTHY EBEL HANSELL
Editor

CALENDAR

March 9 - 17, 1963. International Flower Show, Coliseum, New York, N. Y. Theme: "Gardens are for Living."

March 10 - 16, 1963. Spring Flower Show, Trade and Commercial Center, Philadelphia, Pa.

March 16 - 24, 1963. Ninety-second Annual New England Flower Show, Wonderland Park, Revere, Mass. Theme: "Wonderland of Spring."

March 17 - 22, 1963. Williamsburg Garden Symposium, "The Pleasure and Promise of Gardening." For reservations, Mrs. Mary Deppe, Goodwin Building, Colonial Williamsburg, Va.

March 19 - 20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

April 4, 1963. Members' Evening of The New York Botanical Garden, Essex House, New York, N. Y.

April 17, 1963, 10 a.m. - 3 p.m. Special One-Day Course, "Flowering and Berried Trees and Shrubs," at The New York Botanical Garden.

April 20 - 27, 1963. Historic Week in Virginia, sponsored by the Garden Club of Virginia. For information: Room 3 Mezzanine, Hotel Jefferson, Richmond 19, Va.

April 26 - October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

May 6, 1963. Annual Meeting of The New York Botanical Garden.

May 7 and May 14, 1963. Annual Showing of gardens and penthouse terraces, sponsored by City Gardens Club of New York City.

May 23, 1963. Spring Garden Tour to Far Hills-Peapack, N.J., sponsored by the Volunteer Associates of The New York Botanical Garden.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

June 19, 1963. Reception for graduates of The Two-Year Courses in Botany and Gardening at The New York Botanical Garden.

October 3 - 12, 1963. Fourth World Orchid Conference, Singapore.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

November 9 - 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front-cover illustration—the cactus and succulent section of The Conservatory of The New York Botanical Garden, photographed by Walter Singer; contents page, pp. 5-7, 9-12, 14, 16, 17, 32, 33, Walter Singer; pp. 2-4, Rex Murfitt; p. 8, Henry E. Huntington Library and Art Gallery; p. 13, H. W. Rickett; p. 18, Colonial Studio, Richmond, Va.; pp. 19, 20, Frederic Heutte; pp. 21, 22, Rudy E. Nasution; pp. 25-27, Internationale Gartenbau-Ausstellung, Hamburg; p. 28, Kindermann & Co.—courtesy Berlin Tourist Office.

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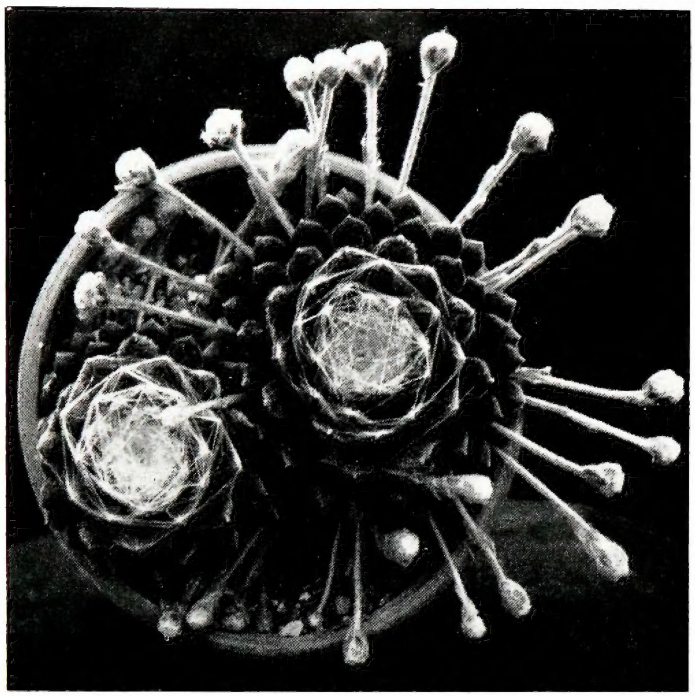


Sempervivum arachnoideum.

SEMPERVIVUMS—

THE HOUSELEEKS

By REX MURFITT

Mr. Murfitt is General Manager of Stonecrop Nurseries Inc., in Cold Spring, New York. Previously he was a forest ranger in biology for the Canadian government and lived in British Columbia for eight years. His early training was obtained under the widely known English horticulturist W. E. Th. Ingwersen.

AT FIRST THOUGHT it would seem pointless to write an article on "hen-and-chickens", it is so easy to pass them by in the garden with a wave of the hand and a general all-encompassing remark. But let us stop a moment and consider this varied and ubiquitous plant in some of its more interesting forms.

The common name houseleek is generally favored over hen-and chickens to describe this group of plants. They were first illustrated in the works of Greek botanists in the first century A. D. The species usually described was *Sempervivum tectorum,* one of the oldest cultivated by man and the original holder of the name houseleeks.* Through the centuries these houseleeks were used on rooftops, since they were believed to be a charm against lightning. Linnaeus' house in Sweden is reputed to have houseleeks flourishing on its roof to this very day. Linnaeus, however, planted the familiar hen-and-chickens. This species, curiously enough, is usually listed in botanical publications as *S. globiferum,* although the discriminating botanist will assert, with justification, that its correct Latin name is *S. soboliferum* Sims (1812). The genus not only reaches back into history, but is fraught with splendid opportunities for horticultural controversy. So there is a story behind the common houseleek growing in the rock garden.

Linnaeus established the genus *Sempervivum* in 1753. At that time there were only six species known to him. Two of them were tender species, the remainder European rosulate plants. Only one has been reclassified in all these years.** To these six original species more were added as the years passed, until over two hundred and fifty binomials were listed in the *Index Kewensis.* Many of these are not true species but hybrids and forms of species described by various botanists through the years. Fortunately for us, Dr. L. Lloyd Praeger in his *An Account of the Sempervivum Group* (1932) reduced this welter to twenty-three species. Since then, many more fascinating sempervivums have been discovered, and thanks to the careful work of such men as Drs. Wale and Giuseppi and Mr. Ingwersen, as well as The Alpine Garden Society publications, they are well described and illustrated.

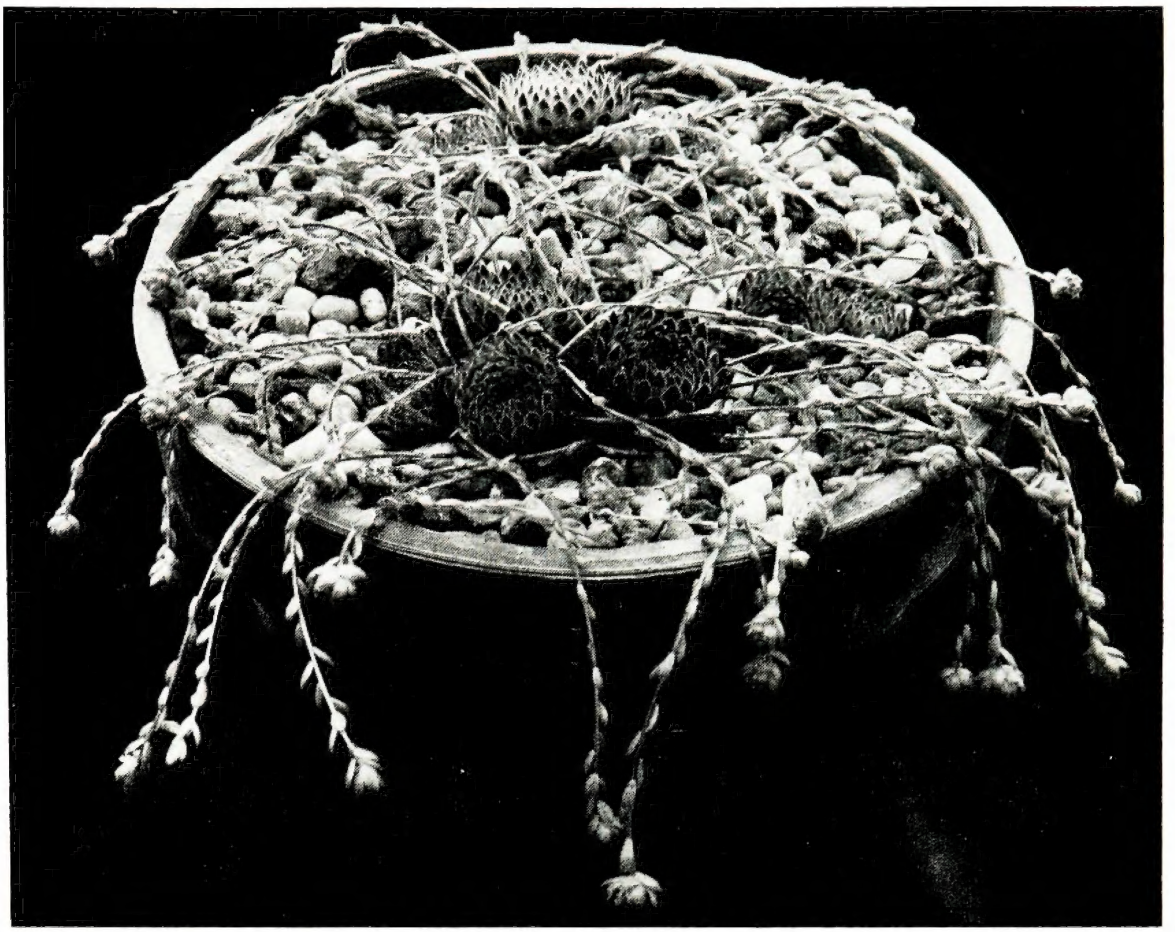
It is from this confused mass of plants that many of our garden sempervivums of today have evolved. The situation has been further aggravated by the introduction of seedlings taken from garden-grown specimens. *S. tectorum* is very common in the mountains of central Europe and is such a variable plant (in size, color, and shape) that seventy synonyms have been attributed to it. To illustrate what happens, let us take one of these forms growing in its natural habitat, along with its neighbor species *S. arachnoideum* and *S. montanum.* Some seed is collected and raised in the garden, the resulting plants are allowed to "cross" with other complex sempervivum hybrids already in the garden, and a new variety is created. How can anyone possibly sort them out? (For fun, take a hybrid between these three species from the mountains and try that combination.) Helpfully, some species have distinct characteristics. One of these, the very popular *S. arachnoideum,* the cobweb houseleek, is easily identified by its unique white cobweb hairs reaching from leaf to leaf. This characteristic will be evident in some hybrids, indicating *S. arachnoideum* as at least one parent, though the hairs appear merely as tufts from leaf tips.

A word about the place of the houseleek in the plant world. Many people assume they are "cacti" and doubt their hardiness. This is largely because of the succulent foliage reminiscent of the ice plant and other such tender plants of the *Crassula, Kalanchoë,* and *Echeveria* genera, which belong to the natural family *Crassulaceae.* The rosulate sempervivums are found in the alpine regions of Europe and Asia Minor. All the European species are quite hardy and easy to grow in our gardens. Some of the more hairy species are injured by too much winter moisture on their foliage, and heat and high humidity will bother some of the rarer species.

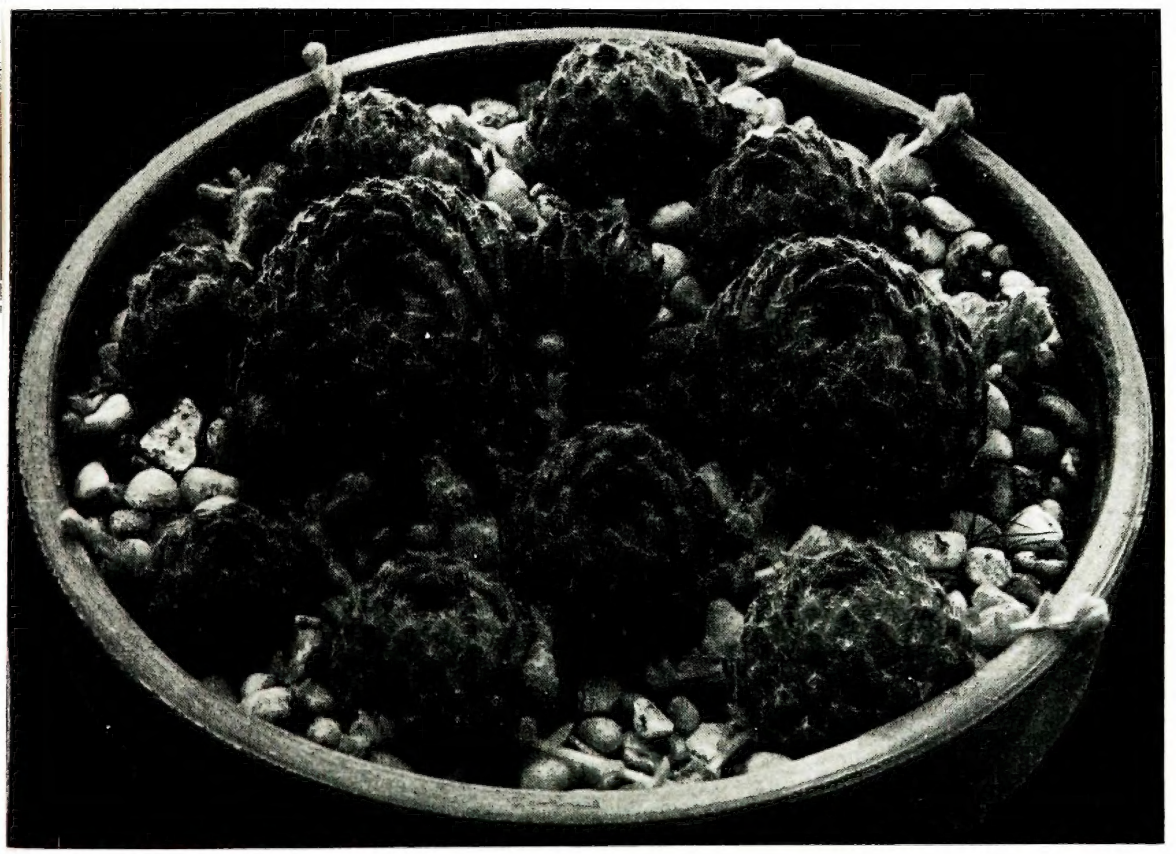
The cobweb houseleek, *S. arachnoideum,* is one of the well-known and popular species. No one seems to be able to resist its neat, woolly appearance. The whole rosette is heavily cobwebbed with thin white threads which run from leaf tip to leaf tip. The density of these hairs is affected by the plant's environment. A plant growing in the shade expands its rosette, the leaves will fatten out and become a pallid green, and the arachnoid hairs be less numerous

*Tectorum means the roof, and a "leek" was first a type of onion with broad flat leaves—later the name was applied to other plants.

**It should be mentioned here that S. globiferum Linn. Species Plantarum 464 (1753) actually contained several other yellow-flowered species.



Sempervivum octopodes.



Sempervivum ciliosum.

whereas a plant happily growing in a crevice or on a ledge will form hard clumps of fluffy white balls. Unlike many houseleeks whose flowers are quite dull, *S. arachnoideum* has bright rose-red blooms with wide petals.

Our old friend the hen-and-chickens houseleek, which from now on we shall correctly identify as *S. soboliferum* Sims (1812), is quite distinct with its flattened green rosettes crowded together in clumps and its numerous offshoots borne on threadlike stolons which readily break, shedding the tiny "chicks" to root where they land. The individual rosette leaves are incurved, glabrous (not hairy), ciliate (edged with hair), and the backs usually have a strong mahogany or red-brown tinge. This species may be confused with *S. hirtum,* a close relative, the chief difference being in the size of the rosette; *S. hirtum* is from two to four inches, semi-open, while *S. soboliferum* is usually in the one- to one-and-a-half–inch bracket. The leaves of *S. hirtum* also have the red-brown mark on the outside. Like *S. soboliferum* it is yellow-flowered, but it flowers a little more freely.

Sempervivum allionii is another closely related, yellow-flowered species which is sometimes confused with the two previously mentioned plants. It is not so common in our gardens, yet in many ways it is a choicer plant, not so free in shedding its young around to become established among other species. The rosettes form tight globes about one inch across and are bright yellowy green. If examined closely, the foliage is seen to be finely pubescent, especially on the reverse, and each leaf is red-tipped.

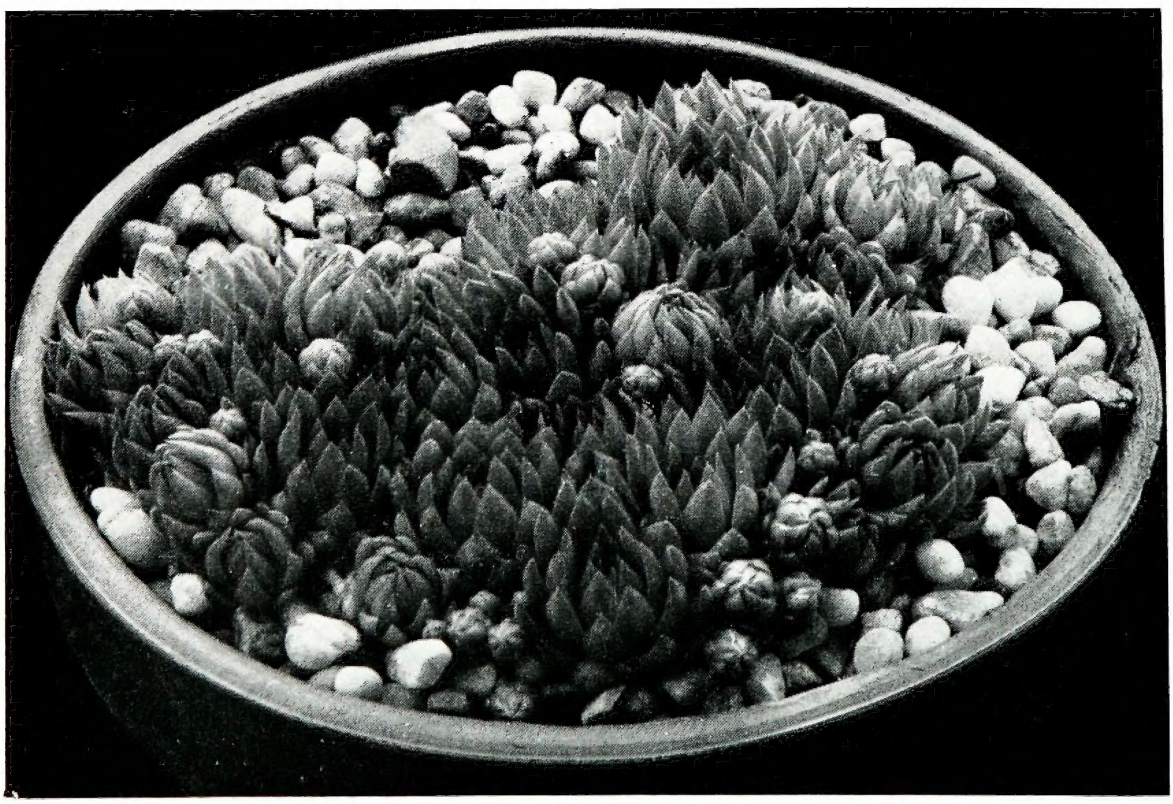
It would take a separate monograph to describe *Sempervivum tectorum* accurately, it is such a polymorphic species and has been awarded so many specific and varietal names. However, it is one of the most used of the sempervivums, and some of its forms are very colorful. It is of obscure origin, yet it has been in cultivation for centuries, as already mentioned. It has smooth, gray-green, purple-tipped rosettes two to three inches across. Horticultural forms and hybrids abound and should be acquired on a personal preference basis rather than on a name, Latin or otherwise.

Sempervivum montanum is quite common in the European mountains, yet the typical plant is hard to find in cultivation as it hybridizes freely. It is fairly distinct with its small, dull green rosettes, one to two inches across; the individual leaves are covered on both surfaces and the edges with fine hair. The stolons that bear the young offsets are leafy and produced freely. There is a form from the southwestern Alps and the Pyrenees called *S. montanum* var. *burnattii,* which is quite constant and distinct. It is larger than the type, growing to four inches across, with lighter green rosettes which are much more open and graceful.

Sempervivum marmoreum Grisebach (1843) or *S. schlehani* Schott (1853) or *S. rubicundum* of gardens, under whichever name you choose to grow it, is a highly decorative plant. It resembles *S. tectorum,* but the rosettes are smaller, averaging about three inches, the basal leaves lying flat on the soil. The leaves are green with a well-marked red or rich red-brown apex. These leaf edges are densely ciliate. Again, this species is very variable. Usually the leaf tip margins are green and the apex red-flushed, but this can be reversed. Several distinct forms that can be obtained fairly true to name are listed. One of them is *S. marmoreum rubrifolium ornatum,* a most striking plant, even if experts cannot seem to agree on its origin. Large rosettes of ruby-red with green tips give the impression they are hand-painted. Another attractive variety, with brown leaves that turn red in winter, is *S. marmoreum bruniaefolium.*

Some of the most interesting houseleeks come from the mountains of the Balkan Peninsula. Fortunately, they are quite distinct and in fairly good order. Dr. R. Seligman and

(Continued on page 23)



Sempervivum allionii.

WINTER GARDENS

By MARY WISTAR O'CONNOR

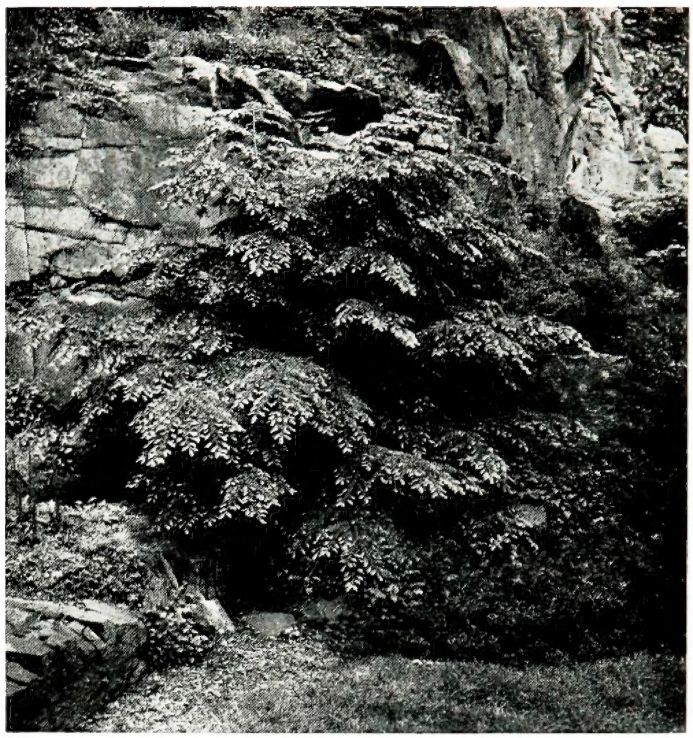
Adapted from the article that was originally published in *Bulletin of The Garden Club of America,* January, 1932.

WINTER IS THE SEASON in which we see nature in its simplest aspect. The basic elements of the garden stand out boldly, and the strength or weakness of its structure is revealed. The successful winter garden is chiefly dependent upon form, color playing a minor role; whether it be the most formal garden or the simplest of natural gardens, its ultimate beauty will depend upon its balance and proportion. The first principle of garden design, and applicable to all gardens, is that there should be unity, that the elements of the garden should be integral parts of the whole, whether harmoniously merged into one another or joined by contrast.

Never, I think, can the garden be taken out of its essential relationship to the house. So much of our time is spent indoors that the views from the principal rooms should compose pictures which will be an unending source of pleasure. But there are times when one is not content merely to gaze from within. The snow may lie deep, or the ground may be frozen and bare, or everything may be thawing, and one's pulses may be quickening in anticipation of spring. The winter garden must be able to meet these varying moods of nature and man and be lovely under all conditions.

A sheltered spot is essential to the garden that is to be enjoyed in winter. A bit difficult, when one's garden is situated on an exposed Westchester hill with a wide and glorious view. Save the view, but it will appear far bluer, far more distant, with judicious foreground planting. The first step should be a wind-break; whether this be formed by walls, fences, or plantings will depend upon the conditions of the particular garden and the preference of the owner. If the garden covers a large area and is in an exposed situation, mass plantings of evergreens will be the solution. The outer boundaries may be planted with the coarser wind-resisting varieties such as red and Austrian pines, the more beautiful and less rugged sorts such as white pine and hemlock being planted on the garden side; but include a leaven of deciduous trees. Oaks and pines enjoy acidity and flourish when planted together even in shallow ground. Where the soil is deeper, hemlocks and beeches form a pleasing combination. Both these groupings are found over and over again in our native woods. With them, dogwoods, lower in height and ever attractive, cheer the bleak landscape with their promise of spring flowers. Exquisite also, and far less used, is wild shadblow, *Amelanchier canadensis.* Its striped gray bark has decorative quality, and its fleecy white blooms appear when the snow is barely off the ground.

To most of us the problem is not how to make a winter garden, but how to make our own particular garden attractive in winter. The individuality of the garden depends principally upon the manner in which the plant material is handled. Let us not be led by the wide choice of trees and shrubs into forgetfulnes of the cardinal virtues of all design, appropriateness and simplicity. There are many beautiful evergreens which can be used but, alas, there are few



Hemlock, *Tsuga canadensis.*

beautiful plantings of evergreens. A common sin against the virtue of simplicity is the mixture of too many varieties, resulting in the effect of a nursery rather than a garden.

It is much more difficult to use exotic evergreens than those that are indigenous. If our native cedars, pines, and hemlocks form the basis of the planting, there will be less likelihood of discord. Other sorts may then be added for greater interest, but the appearance will be spotty if there are too many kinds.

The palette of the garden in winter is much more subdued than at other times of the year. Texture and gradations of tones rather than sharp contrasts are the media with which we have to work. Greens range all the way from the flat silver-green foliage of the concolor fir to the dusky green of the Nordmann fir. These varieties combine well and provide as strong a contrast as we shall probably need. The Nikko fir might be substituted for the dark note; this is a beautiful tree with deep shadows because of the wide spacing of its branches. The very strong blues found in the Colorado and the Koster spruce are too bizarre to be used in our landscape, but a bluish note can be obtained with the more shadowy *Juniperus virginiana glauca,* a blue form of our red-cedar and somewhat similar in growth. It does not brown in winter. The feathery blue retinospora does well in very sheltered locations, and against the background of white pine and hemlock it is a fascinating contrast. The branches, when cut, make the loveliest of winter decorations. As a matter of fact, our native hemlock is a tree of many uses and can be employed to pull together divergent elements in many plantings.

Evergreen shrubs are a particularly interesting group, especially to those whose gardens have been established for some time. While the background planting of trees may have been satisfactorily completed, there are few gardens that can not make room for some of the smaller evergreens. What is more appealing at all times of year than dwarf

box? If young plants are bought locally or farther north, they will not require covering after the first year, provided the snow is faithfully brushed off after every storm. It is the hot sun on ice-covered leaves that causes burning.

Somewhat similar to box, but with larger and brighter leaves, is *Euonymus japonica. Ilex crenata* has small, very dark green leaves; it is useful where a height of four feet is required.

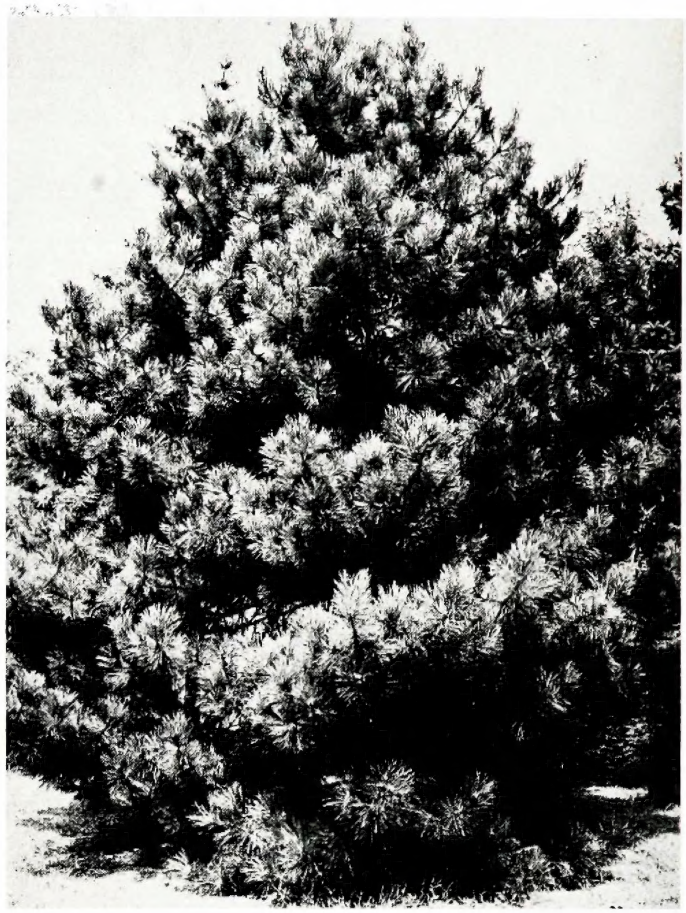
The broad-leaved evergreens, rhododendrons and kalmias, are well known and greatly used. As a group they dislike drafts and will not thrive where there are drying winds. They require an acid, peaty soil.

Shrubs such as *Mahonia aquifolium,* with a leaf somewhat resembling that of holly, and *Pieris floribunda* and *P. japonica* are useful for tucking in between rhododendrons and laurel and to fill up gaps in immature plantings.

An exquisite tiny shrub is *Daphne cneorum.* Give it a well-drained situation and a slight covering of leaves, and you will be rewarded with spicy pink flowers appearing on and off all summer and soft green foliage most of the winter.

Some of the cotoneasters are nearly evergreen, others change to red and bronze before they drop their leaves in early winter. Cotoneasters vary in habit of growth from prostrate to tall upright shrubs. The fruit hangs on well into the winter and is particularly attractive to the birds.

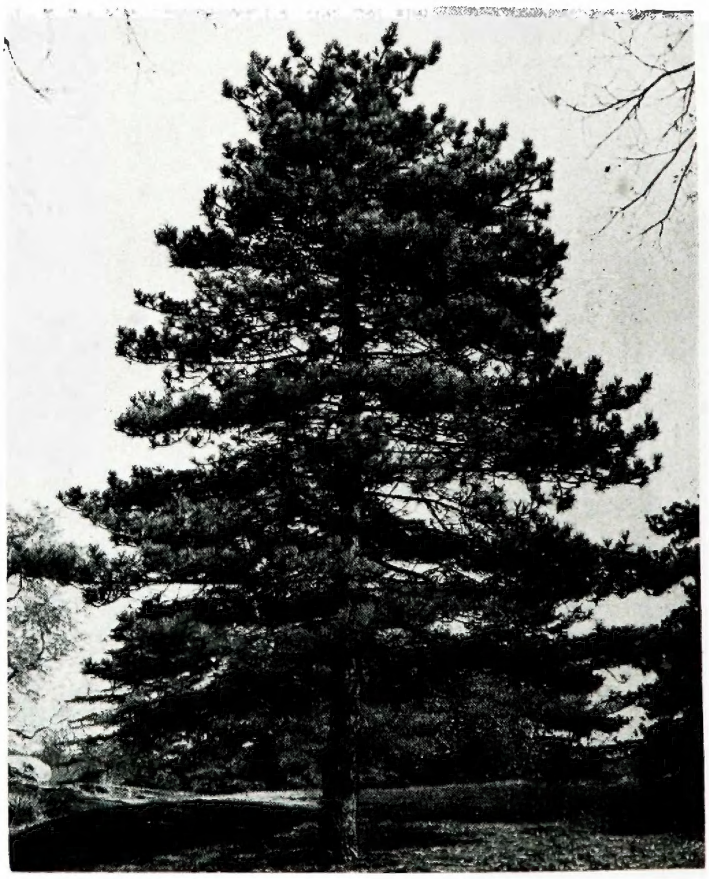
Of course, all berried shrubs that retain their fruit add variety and interest to the garden. Some of the loveliest are *Photinia, Enkianthus, Viburnum opulus,* and *Ilex verticillata,* our native black-alder. All these shrubs attract the birds. If you have birds, you will not be able to keep the



White pine, *Pinus strobus.*

White fir, *Abies concolor.*

Austrian pine, *Pinus nigra.*



berries; but as both give infinite pleasure in winter, they are well worth encouraging.

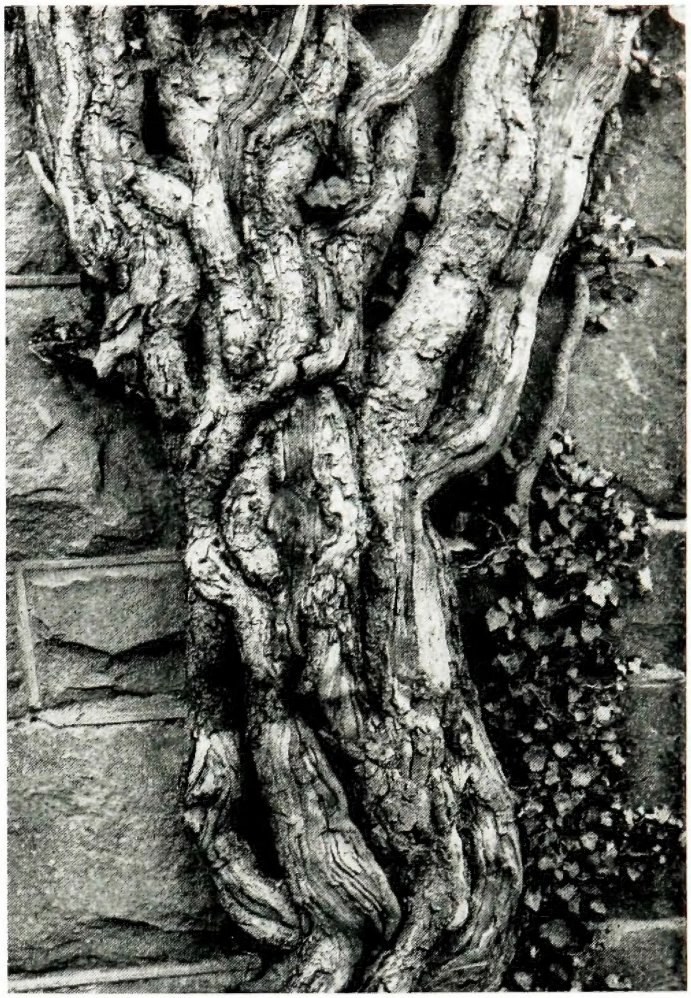
All really old trees are beautiful, and fortunate is their possessor. The fine branches of elms give the impression of an etching when silhouetted against the sky. Shrubs that have a profusion of small branches are not as effective as those with strong outline and definite shape. This is true also of trees; those with some marked characteristic, such as the plane tree and the white birch, are of even greater beauty in winter than in summer.

Unless there is a natural covering of warm brown leaves or needles underneath the trees and shrubs, the appearance of the ground will be improved by the use of one of the small spreading plants, such as *Vinca minor* or pachysandra. English ivy must be used in protected, shady places; the leaves sometimes die back, but the branches come through quite well. It should always be planted in the spring. As a vine English ivy can be used only on the north or east side of walls or buildings.

Certain deciduous vines have much more decorative quality than others. The woody trunks of wistaria and climbing hydrangea, as also of English ivy, form interesting patterns against a wall, while ampelopsis and other small-twigged vines become unsightly when they lose their leaves.

A few perennials that retain their foliage through the winter may be useful for our purpose. The perennial, evergreen candytuft makes a delightful green mound, and *Dianthus plumarius* and *Alyssum saxatile* furnish touches of gray.

If the owner uses the garden only in summer, it really does not matter how it looks in winter. Everything may be covered in burlap, there may be boarded-up statuary and shrouded rose gardens, but for those who spend most of their time in the country what could be more dreary? At first thought this might seem to indicate the elimination of many delightful parts of the summer garden, but it is only necessary to be imaginative and ingenious in the placing of plants that require covering so that they will not obtrude their winter garb upon the eye. These plants may be grouped together and with clever planting devices be completely hidden from that part of the garden important in winter.



The woody trunk of English ivy, *Hedera helix*.

Andromeda, *Pieris japonica*, and mountain-laurel, *Kalmia latifolia*, serve as good background plants in the winter landscape and then contribute a wealth of blooms to the spring scene.

BROMELIADS

By WALTER SINGER

Walter Singer, who is Staff Photographer of The New York Botanical Garden, has long had interest in and experience with bromeliads. In the former Dupuy greenhouses in Whitestone, Long Island, and later at Julius Roehrs Company in East Rutherford, New Jersey, he acquired experience with and information about growing bromeliads in the greenhouse. In Florida, he grew them outdoors. Traveling in Colombia, South America, and Puerto Rico, Mr. Singer had opportunities to collect and observe bromeliads in their natural habitats and to see them used in landscape work. He has also seen them used in landscaping in southern California and Florida. His articles on and photographs of bromeliads have appeared in horticultural publications and garden sections of newspapers. Several years ago when Mr. Singer was greenhouse foreman of the Conservatory of The New York Botanical Garden, he conceived the idea of growing bromeliads on "cork trees." These are constructed of a pipe-skeleton bent in the shape of a tree and covered with cork bark. The hollows of these "cork trees" are filled with a mixture of osmunda fiber, fir bark, and leafmold. This arrangement meets the cultural requirements of most epiphytic types of bromeliads and is an attractive method of display.

A RATHER UNCONVENTIONAL CAB-RIDE to see the landscape artistry of "Mother Nature" was extremely rewarding one Saturday afternoon in 1948 while I was traveling through Colombia, South America. Dr. Enrique Pèrez Arbeláez, one of Colombia's notable contemporary botanists, invited me to visit El Salto de Tequendama, a very picturesque waterfall near Bogotá. En route we passed through a region where wonderful woodlands once existed. Today it looks like a desert, the sad result of man's exploitation of nature's bounty.

Illustration of the pineapple in Oviedo y Valdez: *Historia General y Natural de las Indias* (Vol. 11, p. 46, 1535). From the collections of Henry E. Huntington Library and Art Gallery, San Marino, California.

The depression which inevitably follows upon sight of such a desolate scene was quickly dispelled when we passed the beautiful banks of the Bogotá River. It appeared as though they were covered with a maroon satin spread, embroidered here and there with varying shades of green. Thousands upon thousands of bromeliads made up the glowing spectacle.

Bromeliads are members of one of the largest plant families, the *Bromeliaceae,* which is commonly called the Pineapple Family, probably because the pineapple is the best-known and certainly most cultivated representative.

With Columbus' discovery of America in 1492, the white man's part in the history of the pineapple began. It was already well known to the natives who not only consumed it for food and drink but also used it for fiber and medicinal purposes. Columbus and his explorers, while visiting the West Indies, came upon the pineapple on the Island of Guadeloupe in the Lesser Antilles, now a French possession. However, later evidence indicates that the pineapple presumably came from Brazil or the Guianas.

The Spanish explorers apparently lost little time in introducing the pineapple into the far corners of the world, for not many years after the discovery of America it was reported in India, China, Africa, and the East Indies. The fragrant aroma of the edible pineapple was as great a delight to the discoverers of the New World and to missionaries as it is to us now. "This is one of the most beautiful fruits I have seen wherever I have been in the whole world," Oviedo writes in *Historia General y Natural de las Indias.* His account is accompanied by an illustration that is probably the first illustrated evidence of the fruit. This work was published in Seville in 1535. With such enthusiasm for the fruit, no wonder the explorers and missionaries took the pineapple (*Ananas comosus*) around the world or at least wherever the tropical climate allowed the plant to be grown. This fast distribution of the pineapple should make us realize that its vegetative propagation and cultivation were even then practiced and that the offshoots withstood, in good condition, several months of transportation. Man did not enjoy in those days the quick air-transport service of the jet age.

It was about two hundred years after its discovery before the pineapple was recorded in Europe, although it may have been brought there even before 1686 when it was first fruited in Holland. In England the pineapple produced fruit for the first time in the beginning of the eighteenth century in greenhouses. It is easily understood why time passed before the pineapple was brought to fruit in captivity, because the light and temperature conditions required for producing good results under greenhouse culture were not known then as they are today.

During years of exploration and research, many bromeliads have been found. Except for one species (*Pitcairnia*

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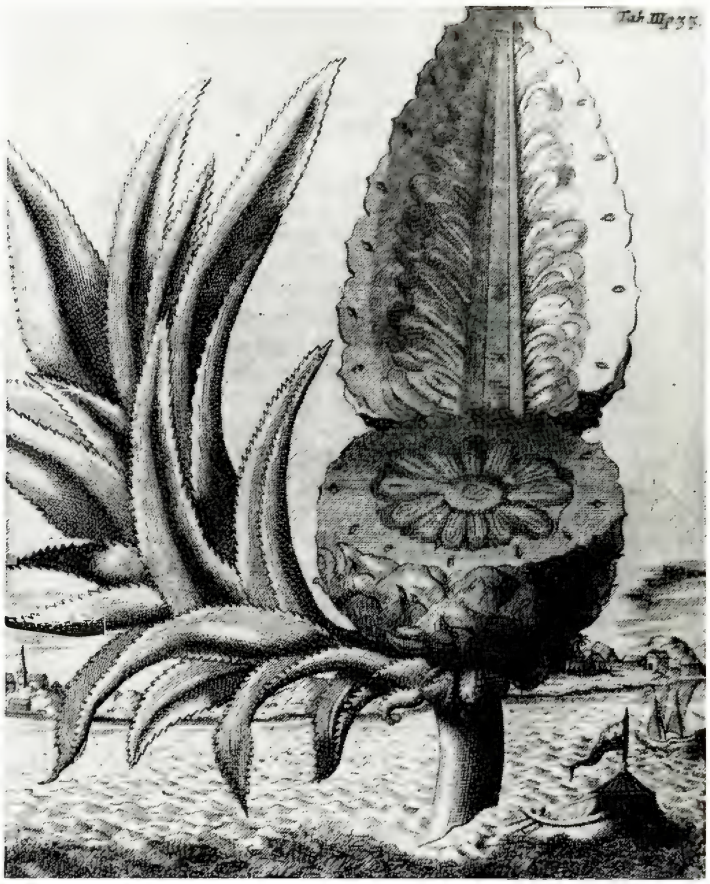


Title page of and three illustrations from the work of Michaelis Friderici Lochneri, published in Norimbergae, 1716.

Aechmea fasciata was introduced in Belgium in 1826.

feliciana) all are natives of the Western Hemisphere. This species was discovered in 1937 in French West Africa and is thought to be native to that area. Geographically speaking, the distribution of bromeliads extends approximately from southeastern Virginia (38°N.L.) to Chile and Argentina (40°S.L.) Since some very primitive types of bromeliads have been found in the Andean area of South America, this region is probably the original source of the bromeliad flora. A great number of species, especially the epiphytic "tank" types, such as the vrieseas whose soft and smooth leaves form water-holding vases, are found in the tropical rainforest of the lower Amazon basin where there is very high humidity. While they get ample light in the rainforest, the light is diffused and not direct sunlight.

In regions where the rainfall is limited and the humidity varies greatly, the terrestrial bromeliads, such as the pineapple and *Aechmea* and *Bromelia* species, grow. Most of these are sun-lovers. The same species grow in tropical temperatures which do not prevail in savannas. Bromeliads of such plains include the rock-loving and terrestrial types that are able to endure long periods of drought. Here are many of the tillandsias that can resist strong sunlight and dry winds because of their physical properties such as a dense scale covering. The distribution and the types of bromeliads vary with the elevation from sea level to about twelve thousand feet in the Andes Mountains in Brazil, Argentina, and Peru. In comparison with the large distribution of the pineapple by man, the Spanish moss (*Tillandsia usneoides*) has the widest natural distribution. This is the result of its prolific propagation by means of offsets, seeds, and division and by its ability to survive adverse conditions ranging from freezing temperatures to the high, dry temperatures of the desert. *Tillandsia usneoides,* named for Elias Tillands, a professor of medicine in the seventeenth century, has the appearance of a tree moss or lichen (*usnea* is Latin for moss) found along the west coast of California. It is interesting to note that this bromeliad had its name changed more than twenty times before its final determination. About sixteen species of this genus are found in the United States.

In 1753 Linnaeus published in his *Species Plantarum* fourteen bromeliads species in three genera and established the generic name *Bromelia* in honor of his Swedish compatriot Olaf Bromel. Later, in 1805, the French botanist

Below. Spanish moss, *Tillandsia usneoides,* an epiphytic bromeliad, hangs from a tree in Florida.

Right. *Tillandsia usneoides* at left, *T. capitata* in front, and *T. sasciculata* at back.

Jaume Saint-Hilaire recorded the family name of *Bromeliaceae.* In the middle of the nineteenth century European commercial growers became interested in bromeliads as house plants, for collectors were bringing them back as well as orchids. However, since most of these early importations were for botanical gardens or private estates, the commercial growers ordered decorative bromeliads to be collected for them. Collecting bromeliads was not a difficult task, since many grow in the same localities and under the same conditions as some orchids.

One of the early introductions was *Aechmea fasciata.* It was introduced in Belgium in 1826, flowered for the first time in Kew Gardens in England in 1878, and was named *A. fasciata* in 1879. Today it is still the most widely cultivated decorative bromeliad in Europe, especially in Belgium, though its many horticultural forms have slightly changed its original appearance. I still have a treasured photograph of *A. fasciata* which I took, in 1924 with my first camera, in my father's greenhouse in southeastern Germany, a place in those days far removed from the jungles of Brazil. I next met with bromeliads as an apprentice in a horticultural area of northern Germany where, because of the influence of nearby Belgium and Holland, bromeliads had been grown for some years.

Large contributions were made by famous European collectors in Belgium, England, France, and Germany, both in introducing many new species as well as describing and illustrating them. Some of the colorful illustrations are treasured possessions and in spite of our modern methods of reproduction are still unsurpassed. At the end of the nineteenth century *La Belgique Horticole* published much on bromeliads and in the same period a handbook on bromeliads was written for the first time in the English language. It contained eight hundred species.

In 1896, the German botanist Carl Mez wrote the first monograph on the bromeliads, covering 997 species; a second edition was published in 1935 with 1,516 species. This was the most complete monograph on these plants until Dr. Lyman B. Smith, Curator in the National Herbarium of the Smithsonian Institution, began his work. According to Dr. Smith's estimate in 1960, there are now more than eighteen hundred, possibly almost nineteen hundred species in forty-eight genera. Dr. Smith accepted a great part of Mez's monograph but has elaborated upon and increased the number of species by reason of the new material available in recent years. With due respect to all who have contributed to the work, Dr. Smith is the recognized authority on the *Bromeliaceae* and merits admiration and respect for his untiring efforts. All who are interested in this plant family eagerly await his monograph.

Dr. Smith's work has contributed to the increase in popularity of bromeliads on the American continents; they were more widely known and grown in Europe than here. Until the plant quarantine went into effect, more new bromeliads were introduced from Europe into the United States than directly from Central and South America. (Were it not for the rigorous methods of fumigation under the quarantine regulations, we would get many more new hybrids.) After World War I, ties with our neighbors south of the border became closer, and modern means of transportation made it easier and quicker to reach the Central and South American jungles. Home owners became aware of the value of bromeliads as house plants, and those who lived in or moved to Florida, southern California, and Texas found that these plants could be grown outdoors.

Hechtia argentea is a terrestrial bromeliad from Mexico.

In 1950 bromeliad enthusiasts founded the Bromeliad Society which now numbers members all over the globe. The Society aims to promote the popularity of these plants, to learn more about the *Bromeliaceae,* and to exchange knowledge and views on cultural methods.

In addition to the decorative quality of many bromeliads and the industrial value of the pineapple, certain other members of the family are economically important to the natives of Central and South America. Indians in Brazil use bromeliads for fiber in making ropes, nets, and hammocks. Natives of other regions use the tender hearts of puyas, bromelias, and tillandsias as vegetables and let the juice ferment into an alcoholic beverage which may not be as potent as vodka but puts them in a happy mood. I came upon such gaiety when I focused my "Rolleiflex" on a native. Unfortunately for me, he had never seen a camera before, and had it not been for a peaceful resident who could converse with the Indian in his language and understood my own, camera and I might not have returned to Miami. Perhaps he confused the camera with the evil eye!

The flowers of some of the bromeliads (flor de Santa Maria) are used for decorations at Christmas (Navidad). The water collected from some large plants is believed to be pure and sacred and therefore is used to baptize infants. (I have been showered more than once by water from bromeliads, as I reached for them high above my head.) This water is also a blessing for cattle, and for anyone who is desperately thirsty in the heat of the day.

Bromeliads are used by the natives for their medicinal properties, and these properties are the cause for research

in recent years. Bromelin derived from certain species, such as *Ananas comosus,* the pineapple, is used as a vermifuge, purgative, or diuretic component in medicine. More recently, research has revealed its ability to digest protein, enabling it to dissolve scabs or other dead tissue; it is also used successfully for tenderizing meats and for chill-proofing beer. The importance of the pineapple in the West Indies is illustrated on postage stamps of Jamaica, which show the fruit framing a picture of Queen Elizabeth. The Spanish moss is being considered as a source for wax and for surgical dressings. For many years it has been used for upholstery, but the relatively small financial return does not compensate for the work entailed. At one time the Spanish moss was considered a parasitic pest, not even thought of as a plant. Close observation and study proved it to be an epiphyte, as are many other bromeliads which use trees, shrubs, or other plants only as a support. They do not take food from the supporting plant as do such parasitic plants as the mistletoe.

This brings us to the classification of bromeliads in relation to their natural habitats, a classification important to an understanding of their requirements and culture. There are two groups: the epiphytic bromeliads that grow upon trees, shrubs, or plants, (*epi,* Greek for on or upon, and *phyton,* Greek for plant); and the terrestrial bromeliads that grow on the ground (*terra,* Latin for land or soil). These include the saxicolous species (*saxum,* Latin for rock, and *colere,* to inhabit).

Bromeliads growing in a "cork tree" in The Conservatory of The New York Botanical Garden attract the attention of a visitor.

A typical example of the first group of bromeliads is the Spanish moss, which has all the characteristics of an epiphyte. The leaves are covered with hairs or scales which resist the drying winds, direct sunlight, and lack of humidity. Not all epiphytes have such fuzzy (lepidote) leaves; some from areas where there is ample humidity and rainfall have smooth or glabrous leaves. The root system of the Spanish moss is insignificant and undeveloped; it was believed for a long time that Spanish moss had no roots at all. While the Spanish moss does not show to the naked eye evidence of a cell arrangement capable of absorbing food and water from the air and rainfall, we know that this is so, because it is a living plant. With the larger "tank" types, the capacity for water and food absorption through cells on the bottom of the leaves is more easily discerned. These bromeliads collect rain water in their tanks or vases and absorb the water from their reservoir as needed. If a bromeliad should fall to the ground and in so doing be unable to hold water in its receptacle, this could be fatal. Again and again it has been proved that the root system of numerous epiphytic bromeliads is merely a means of clinging to a tree or cactus or other plant for support. To a certain degree, their roots are capable of absorption, but not so much so as the roots of terrestrial bromeliads which depend almost entirely on supply of food and water from the soil.

The pineapple is an example of a terrestrial bromeliad which is cultivated on plantations in different parts of the world. Its straplike, leathery leaves, equipped with thorny tips and prickly edges, are characteristic of some terrestrial bromeliads. Unless you have handled and have been cut or scratched by bromelias or aechmeas, you have no idea how sharp and dangerous such hooked edges are. Other terrestrial types growing on the floor of the tropical rainforest have wide, smooth leaves, with straight edges, often very colorful. The saxicolous types, such as hechtias or dykias, grow in full sunlight on rocks or in rock crevices, and their foliage is similar to that of the terrestrial bromelias and aechmeas. Dykias, and also puyas, produce flower-stalks which excel in color and size. Most of these bromeliads live in the same conditions that cacti and succulents live in, and very large specimens are cultivated for use in southern landscape gardening. The finest such collection in the United States is in the Cacti and Succulent Garden of Huntington Botanical Garden in San Marino, California.

Surprisingly enough, they are also quite hardy in regions where frost usually does not last long. Both in California and in Florida bromeliads survive nights when the temperature falls to 25°F or even lower. The first sign of frost injury is discoloration or bleaching of the foliage. Protection against possible damage can be had by burning smudge pots or turning on sprinklers during the coldest hours of the night, or by covering individual plants with sheets of polyethylene. Before one plants bromeliads outdoors, it is advisable to become familiar with local weather records.

THE LIFE STORY OF A FERN

By HAROLD WILLIAM RICKETT

Dr. Rickett is Bibliographer, Senior Curator of the Library, and Deputy Assistant Director (Botany) of The New York Botanical Garden.

The following was published originally in *The Journal of The New York Botanical Garden*, March, 1940.

FEW PERSONS other than botanists with microscopes have ever seen the individual spores of ferns. So unfamiliar are they that many curious legends were built up around these "seeds" in the past. Their magical properties, it was told, might even render their lucky owner invisible; he assuredly never thought of using them to raise new ferns. Yet this is the sole function of the dust-like particles that are scattered almost invisibly into the air from the leaves. Actually a fern has no true flowers, fruits, or seeds. These minute spores are its reproductive bodies.

In temperate countries ferns are composed mainly of green leaves, often large and divided into hundreds of segments; they grow from small stems at or beneath the surface of the ground. Some have a short thick stem more or less erect in the soil but never projecting much above it. The stem of others kinds is slender and extends horizontally. As it grows at the tip the opposite end may die, so that the whole fern creeps, so to speak, through the soil. A creeping stem may fork, the two branches diverging and eventually becoming separated by the death of the older parts. The result is comparable to the natural production of new strawberry plants by runners.

The leaves of many ferns have similar methods of propagation. One kind has leaves that taper to a fine point, from which, when it touches the ground, a new plant springs. Other kinds form minute buds on their leaves; these fall to the ground and continue growth independently of the parent. A few form new plants on their roots. All these are considered methods of vegetative propagation, not strictly comparable to the formation of new plants from seed.

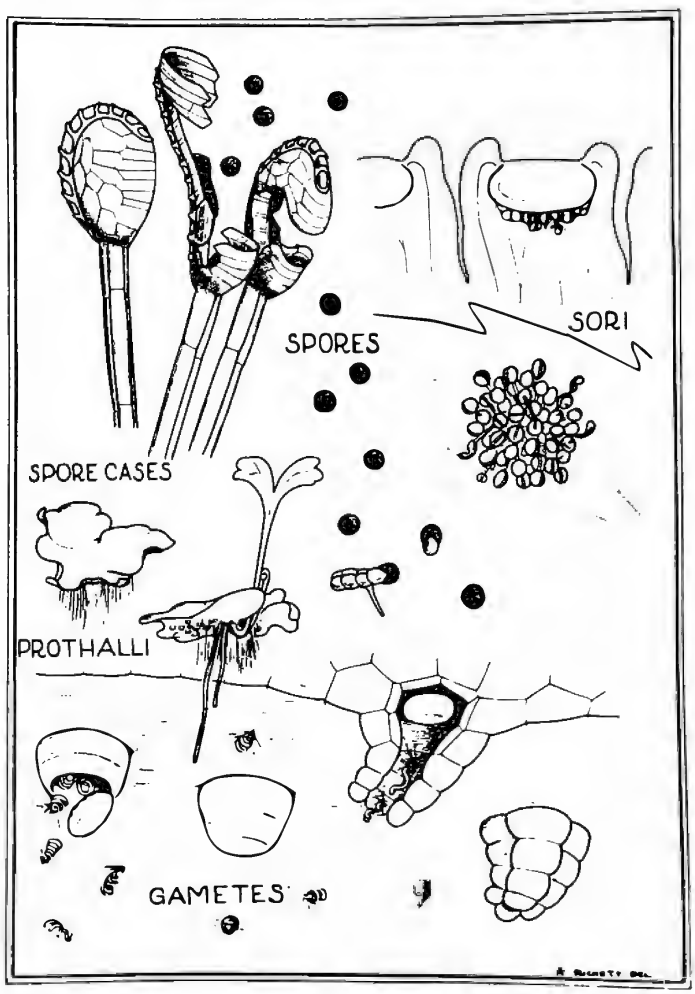
Ferns do, however, reproduce also in a less casual and more specialized manner that may be likened to the production of flowers by a flowering plant or cones by a conifer. If you examine a leaf, or frond, as it is often called, well along in the growing season, you will probably find on the lower side of some of its segments small brown or orange spots, rough or scale-like in appearance, usually fairly uniform in size, shape, and arrangement. These are the normal reproductive structures formed by the leaves, filling the place of flowers in the fern's economy. They are commonly known as fruit-dots, or, more technically, *sori* (singular, *sorus*).

To penetrate the secrets of the life cycle of a fern, it is necessary to use a microscope. If you use a hand lens on a sorus, you may be able to see that it is composed of several hundred globular brownish bodies attached to slender stalks that project from the under surface of the leaf. These are spore-cases, which in many ferns are concealed beneath a small and characteristic scale which grows over them from one side or which protects them like a minute umbrella or which almost completely encloses them like a sack. So characteristic are the size, shape, arrangement, and covering of the sori that they are much used in classifying and identifying ferns.

Several spore-cases may easily be removed from a sorus with a dissecting needle and studied with a more powerful microscope. Those that appear opaque obviously contain some fairly solid matter. Beginning near the point where the stalk is attached to the spore-case and extending up the side and over the top is a raised ridge something like the crest on an ancient helmet, golden-yellow or orange in color. When mature this crest dries, and as it dries it straightens, tearing apart the walls of the sack to which it is attached and spilling into the air a number of minute particles which were within. These are the spores. After a while the crest may curl again to its former shape, often so violently as to throw out any remaining spores that may adhere to the torn walls of the spore-case. The empty spore-case remains attached to the leaf and appears transparent.

The spores, dust-like particles set free in the air about a

The life story of a fern, from the sori on the leaves to the first small fronds of a plant which is actually two generations removed, the intervening generation showing in the prothalli with the greatly enlarged drawing of the gametes.



Fruit-dots, or sori, on the under side of the leaves of *Dryopteris marginalis*.

fern frond, are distinguished from true seeds by their small size and by their lack of differentiated parts. No embryo plant may be found within a spore. Each, however, bears the living matter that can eventually grow into a fern plant with its characteristic parts. A fern leaf may produce several millions of these bodies, each potentially a new fern. They float easily in the air and are dispersed by the slightest breeze. If all were to live and grow, we should soon be fighting our way through a jungle reminiscent of the vegetation of the earth millions of years ago. Since the surface of the globe is already well occupied, most of the spores must die. Their chance of survival depends on finding a vacant millimeter or so of moist soil or rock crevice where the temperature is moderate and the sun's rays do not strike. In such a fern Utopia the spore rapidly enlarges and begins to take on the characters of a mature fern plant.

At this point the observer meets his greatest surprise. The new plant that develops from a spore is surely a fern, since its parent was a fern; but it does not look like one. Even when mature it has no leaves, no stems or roots. It is a small, delicate, dark green object, resembling most a minute and rather formless leaf with crinkled edges. It may, with luck, live for several years, and, if carefully cultivated by a well-disposed botanist, may reach a diameter of an inch or two; but that is all. It never attains anything that the ordinary observer would think of as fernhood. To distinguish it from its more imposing parent it is known as a *prothallus* (or *prothallium*). Under certain conditions it may become heart-shaped or even butterfly-shaped; if crowded, as it usually is, it is likely to be irregular. It may lie flat on its substratum, anchored by minute white hairs which grow from its under side. Or, if it grows in a cave where light enters only from one side, it may stand nearly erect on one edge, facing the light. Prothalli are not easily found in nature, but occasionally carpet a moist ledge or the floor of a cave with a dark green, moss-like growth.

As they differ from the parent plant in size and shape, so they differ also in their manner of creating a new generation. On the lower surface of the prothallus, projecting into the film of water that separates it from the substratum, are two kinds of reproductive structures. One kind is dome-shaped. At maturity a lid opens and through the opening many minute objects are expelled into the film of water. Each of these is shaped like a coiled spring. Near one end are attached many extremely delicate hairs which vibrate and lash the surrounding fluid, thus imparting to the coiled body a characteristic rapid, tumbling motion. When observed in a microscope, a prothallus may be seen to be surrounded by a swarm of these tiny swimming creatures, resembling water insects rather than anything related to a fern. They are named *gametes*.

The other reproductive structure is a sort of flask with an open neck which projects downward into the water. Of the thousands of swimming gametes that may be present near the prothallus, a few may chance to pass near the mouth of one of these flasks; these respond to some substance emitted from its interior, swim towards it, and enter the opening. At the base of the neck is a chamber which contains a single gamete of a different sort—a comparatively large and immobile body. When one of the swimming gametes reaches this, the two unite and become what is called a *zygote*. This is the beginning of a new fern plant, a living structure capable of growth to maturity and soon recognizable as a fern of the familiar type. The prothallus has thus produced a new generation, not by spores, not in any way that recalls the manner of reproduction of its parent, but in a highly intricate and specialized manner of its own.

Several weeks after the union of the gametes, the student may observe a tiny hair-like root extending from the prothallus into the substratum. This is not a root of the prothallus, which never has one, but belongs to the new plant; it is one of the first visible results of the growth of the zygote. Soon afterwards a small leaf uncoils from the same spot; then another, a series of them, each a little larger than its predecessor, each a little more like a characteristic fern frond. Finally, after many months, a stem begins its slow and inconspicuous advance into the soil, and develops its crown of fronds. The prothallus withers and dies, having produced its single offspring. A new fern has been formed, a fern like that with which we began this history.

To sum up this remarkable series of events, a fern is not one kind of plant but two. The more familiar plant is known to botanists as the spore-forming plant, or *sporophyte*. Any spore that it forms is capable of growing into an inconspicuous gamete-bearing prothallus, known as the *gametophyte*. This in turn through the activity of its gametes gives rise to a new sporophyte. The two types of fern alternate in the life cycle. Parent and offspring differ in size, structure, and method of reproduction. Heredity in ferns means that the characteristics of the parent are never exhibited by the immediate offspring!

This very elaboration of the life cycle has been a factor in the downfall of the ferns and the rise of the flowering plants. For one prothallus millions of spores are formed and scattered by the wind to fall mostly in places unfit for their development. The prothallus is a fragile thing, easily destroyed by even temporary drought. To form one zygote

(Continued on page 23)

THE GARDEN'S HERBARIUM
Its Importance as a National Facility

THE NEW YORK BOTANICAL GARDEN is relatively young when compared with some botanical institutions. It was founded in 1891. Almost at once, however, it became the depository of several large and important collections of great historical significance, especially the herbarium of Columbia University and later the herbaria of Columbia School of Pharmacy and of Princeton University. By purchase and exchange through the years, additional hundreds of thousands of specimens have been obtained from all parts of the world. Perhaps the greatest strength of the collections, however, has come from the dedicated field work of staff botanists, associates, graduate students, and special collectors employed in specific areas. These personal collections, fully documented in their published works, are unique and irreplaceable scientific records.

Among the great workers in systematic botany whose collections, made while they were staff members, are deposited wholly or in part in the Herbarium of The New York Botanical Garden are Elizabeth G. and Nathaniel Lord Britton, R. S. Williams, L. M. Underwood, P. A. Rydberg, William A. Murrill, John Kunkel Small, Marshall A. Howe, F. J. Seaver, H. H. Rusby, Percy Wilson, George V. Nash, and W. W. Eggleston. The Garden also has extensive collections made for research purposes by staff members and ex-members who are still living: Henry A. Gleason, A. C. Smith, Harold N. Moldenke, E. J. Alexander, Joseph V. Monachino, Wendell H. Camp, Richard S. Cowan, J. J. Wurdack, David D. Keck, William C. Steere, Arthur J. Cronquist, Bassett Maguire, Louis P. Politi, Clark T. Rogerson, David J. Rogers, Donald P. Rogers, Mary Fleming, and Frank C. MacKeever.

In its seventy years of existence, the Herbarium has acquired approximately three million specimens. It ranks among the three largest herbaria in the United States, the others being at Harvard University and in Washington, D. C. With its emphasis on North and South American plants, and its extensive series of collections representing the life-work of many professional botanists, the Garden's Herbarium is one of the principal research collections of its kind in the world and supports the Garden's programs of systematic, physiological, pathological, and biochemical investigations.

No other American institution has provided a wider coverage of descriptive regional floras of the Western Hemisphere: for example, *The New Britton and Brown Illustrated Flora of the Northeastern United States* and *Adjacent Canada,* issued in two sections by Dr. Britton and entirely revised by Dr. Gleason; Small's floras of the southeastern States; Dr. Rydberg's floras of Colorado, the Rocky Mountains, and the Great Plains; Dr. Britton's floras of the Bahamas and Puerto Rico. Britton's field researches were directed toward a floristic coverage of the entire Caribbean; at the time of his death incomplete manuscripts were left for floras of Cuba and Trinidad. His collections and manuscripts have been the basis for the continuing publication of the Flora of Cuba by Brother Alain and the Flora of Trinidad by the staff of the Imperial College. No modern work can proceed on any segments of the floristic study of the West Indies without dependence on the Herbarium of The New York Botanical Garden.

The comprehensive *North American Flora,* conceived by Dr. Britton, is still in course of publication at the Garden.

Dr. Cronquist and associates, continuing in this traditional and productive activity, are concluding the Flora of the Pacific Northwest. Dr. Cronquist is also engaged in field work preparatory to a flora of the intermountain region of the western United States. The background of this project was developed by Dr. Maguire over a period of some fifteen years.

Since 1944 Dr. Maguire has been occupied with floristic programs in the Neotropics. His field activities have been concentrated primarily in the phytogeographic province of the Guayana Highland of South America lying north of the Amazon River, an area that is botanically less well known than any continental area of the world. Complementary studies have been carried on in coastal Guiana, the Amazon Basin, the Andes, and Brazil. Preliminary reports on the results of more than thirty explorations have been appearing since 1948.

A floristic investigation and ultimate publication on the great Brazilian interior highland to the south of the Orinoco is being projected. Such a study would supplement and complement that of the Guayana Highland, would advance knowledge of the phytogeography of South America, and would contribute to an understanding of the history and dispersal of the vegetation of the Neotropics.

Dr. Howard S. Irwin has had wide experience in the tropics; he participated in two extensive expeditions in the Brazilian Highland and taught in Georgetown, British Guiana, for five years. He has been co-leader of two of the Garden's recent expeditions; one to the Rio Oiapoque on the Brazilian-French Guiana frontier, and the other to the Rio Jarí. Both expeditions were concerned with the flora of Amapá, Brazil.

Dr. Irwin expects to extend his monographic study of the genus *Cassia* and of the tropical American *Leguminosae* in general.

During his long association with the Garden, Mr. Alexander has been engaged in taxonomic studies on the *Cactaceae, Compositae, Crassulaceae, Iridaceae,* and other families and has published extensively on them. He is recognized for his knowledge of the plants of southeastern North America and for his remarkable ability to identify plants on sight. He is also called upon to identify cultivated plants as a service to the public and to assist the Gardening Department in identifying plants in the Garden's living collections. Mr. Alexander spent most of 1945 in southern Mexico, collecting six thousand herbarium specimens of some twelve hundred plants. He has also collected in Puerto Rico, the southern Appalachians, and the Rocky Mountains.

Mr. Alexander has been responsible for *Addisonia* since 1929, having been appointed its Editor by the Board of

Managers on recommendation of the late John Hendley Barnhart. Dr. Barnhart had edited *Addisonia* since its first issue in 1916.

In the related field of paleobotany, Dr. Herman Becker has pursued intensive field studies in selected areas of the western United States, which have provided new information about the Tertiary Floras of North America. He plans further field work in the Ruby and Grasshopper Basins of Montana. He is preparing reports on these areas and on the Ruby York Ranch Flora, also of Montana. Dr. Becker is completing monographic reports on the fossils of the *Berberidaceae, Cruciferae, Eucommiaceae,* and *Limnanthaceae.* He consults existing floras in the Garden's Herbarium in support of his paleobotanical researches.

In cryptogamic taxonomy, Dr. Rogerson proposes to conduct studies of the fungi of northern South America concomitantly with the work on phanerogamic botany in that region. He is presently engaged in research on the taxonomy of the Pyrenomycetes and Gastromycetes. Dr. Rogerson is preparing a monograph on the genus *Hypomyces* and studies on North American species of the *Hypocrea* and *Nectria,* the Gasteromycetes of northeastern United States, and the fungi of northern South America.

Dr. Steere, after extensive field work in North and South America, has in recent years been concentrating his efforts on the bryophytes of arctic North America. He is pursuing monographic studies of local mosses and has planned a major work to be entitled Bryophytes of Arctic North America.

In economic botany, Dr. Rogers is investigating species of *Manihot* to determine the origin, evolution, and classification of the cultivars of *M. esculenta.* Commonly known as cassava, mandioca, yuca, and, infrequently, tapioca, *M. esculenta* is one of the three major carbohydrate food plants of the lowland tropics. Dr. Rogers has done field work in most of the significant areas in South America where native and cultivated species are found, and is continuing revisionary monographic studies of the genus as a whole and of the cultivated species separately.

In his researches that concern drug plants, Joseph Monachino has gained an exceptionally broad familiarity with plants of the world. Mr. Monachino has carried on taxonomic studies in the *Loganiaceae, Sapotaceae, Asclepiadaceae,* and *Apocynaceae.* He has contributed to the reports on these families in the studies of the floras of Guayana, Guiana, Amazonia, and the Brazilian Highland.

As Bibliographer and Curator of the Library, much of Dr. Rickett's activity is related to taxonomic research and studies pertaining to plant nomenclature. He serves as a member of the General Committee on Nomenclature of the International Association for Plant Taxonomy and as Secretary of the Committee for Spermatophyta, and has been author of many of the nomenclatural proposals submitted to the Association. Dr. Rickett has also been concerned with the history of exploration and with descriptive morphological terminology, and has published widely on both subjects. He edits for publication most of the work that emanates from the Herbarium. He is preparing a Field Book of American Wild Flowers, Northeastern United States.

Former staff members continue to consult the Garden's Herbarium. Dr. Cowan, Dr. Smith, and Dr. Wurdack, all now identified with the United States National Museum, Smithsonian Institute; Dr. Camp, now head of the Department of Botany, University of Connecticut; and Dr. Gleason are among the many who do so.

Dr. Cowan was concerned during his professional activity at the Garden with the Guayana Highland program. He became interested in the tropical *Leguminosae* and *Rutaceae* and has been responsible for all reports on these two families in the continuing "Botany of the Guayana Highland."

When Dr. Smith, now Director of the United States Natural History Museum of the Smithsonian Institute, was a staff member of The New York Botanical Garden, he undertook several explorations to the West Indies, British Guiana, Brazil, and the Colombian and Peruvian Andes. The specimens he collected are important to any student of the South America flora. In continuation of his studies of the *Ericaceae* and *Monimiaceae,* Dr. Smith draws upon the Garden's Herbarium.

During his tenure at the Garden, Dr. Wurdack was active in the program of exploration of the Guayana Highland. He was a participant in more than twenty expeditions and the leader of several, gaining broad experience with the flora of the Neotropics. Dr. Wurdack was introduced to the *Melastomataceae* at the Garden and since the retirement of Dr. Gleason has become the authority in this important tropical family. He has been a joint author of "Botany of the Guayana Highland" to the present time. His further contribu-

Dr. Bassett Maguire is telling Mrs. Maguire about *Wunderlichia mirabilis,* a truly unusual tree as is indicated by the name that the imaginative German botanist gave to it in 1884. *Wunderlichia mirabilis* Riedel ex Baker is a member of the Compositae, and the family to which the dandelion, the daisy, the chrysanthemum, and the sunflower belong. It is remarkable in that its huge flowerheads are covered with such dense wool that they look like masses of fleece. The tree, shorn of its very large leaves, gives the impression of a surrealistic painting.

The genus *Wunderlichia* is confined to the central highlands of Brazil. But another group of tree composites, perhaps the biggest tree composites in the world, has been found in the Guayana Highland where The New York Botanical Garden has been carrying on plant exploration for a number of years. This suggests a very ancient relationship in evolution, in phylogeny, and in distribution. Dr. Maguire is now attempting to collect specimens to supplement the material in the Garden's herbarium in order that he may undertake a taxonomic study of this group of fascinating plants.

tions to the *Melastomataceae* will appear in *Memoirs of The New York Botanical Garden.*

During Dr. Camp's long tenure at the Garden, he was engaged in exploration and biosystematic studies. Much of the material he collected in Mexico and Ecuador is still to be investigated, and it will play a considerable role in future taxonomic activity at the Garden. Dr. Camp is especially known for his writing on the *Vacciniaceae.*

Dr. Gleason's duties at The New York Botanical Garden were associated with floristic and monographic activity in the flora of northeastern South America. He gave special attention to American *Melastomataceae* and became the outstanding Western Hemisphere authority on this family.

It fell to his good fortune to receive the plants collected by the late G. H. H. Tate, mammalogist at the American Museum of Natural History, on his explorations of Roraima, Duida, and Auyan-tepuí, all of Venezuelan Guayana. It was, indeed, these collections and Dr. Gleason's study of them that led to the Garden's program of exploration of the sandstone areas of Guayana which has been in progress since 1944.

For the last ten years of his active work at New York, Dr. Gleason set for himself the enormous task of revising Britton and Brown's Flora of the Northeastern United States and Adjacent Canada. This three-volume edition is one of the most influential writings in descriptive American botany.

Even before Dr. Gleason came to the Garden, his observations on ecological problems and interpretations were of considerable importance, and they continue to influence ecological thinking today.

However, after his retirement in 1951, there was no definitive program for ecology at The New York Botanical Garden until the appointment in April, 1961, of Dr. Dansereau as Assistant Director (Botany). Dr. Dansereau has had broad experience in ecology and phytogeography, and much of this activity is related to taxonomy and herbarium procedures. He is pursuing studies of plant succession—local, regional, post-glacial—and structural response to climate and site. He is also engaged in regional description of vegetation in Baffin, eastern North America, Macaronesia, western and central Africa, New Zealand, and Brazil. Dr. Dansereau has published in Canada and the United States.

In addition to the work by staff members and graduate students, evidence of the Herbarium's importance is given by the large and steady stream of visitors, both established botanists and graduate students from other institutions, who come to study the collections.

Among the prominent botanists who visit the Herbarium is Dr. Richard S. Howard, Director of Arnold Arboretum, Harvard University. Dr. Howard finds reference to the collections of Dr. Britton and his associates necessary to his research on the Flora of the West Indies. Dr. Julian A. Steyermark of the Instituto Botánico and Jardin Botánico, Caracas, Venezuela, spent several months in 1961 at the Garden and will visit the Herbarium again this fall in pursuit of his study on the *Rubiaceae* of that country. Dr. Howard O. Crum of the National Museum of Ottawa, Canada, Dr. Harry A. Miller of Miami University, and Dr. R. M. Schuster of the University of Massachusetts consult the Herbarium in connection with their investigations on the *Hepaticae.*

Those who are unable to visit New York personally may borrow the specimens they need, in accordance with a general custom in this country and abroad. During 1958, over twenty-nine thousand specimens were loaned to one hundred and twenty-two institutions and individuals, and in 1959 over twenty thousand specimens went out on one hundred and nine loans.*

It is interesting that the material borrowed from other institutions by The New York Botanical Garden averages less than five thousand specimens a year. This illustrates the standing of the Garden as a national facility.

The growth of the Herbarium of The New York Botanical Garden from modest beginnings to one of the major collections of the world has been accompanied by the pains common to all growing collections. First, the equipment for adequate storage has not kept pace with the constant increase of the collections. Too large a proportion of the collections are housed in the original wooden cases built more than sixty years ago. (Through the necessity of moving the cases more closely together from year to year to tighten up on space, and also from sheer age, the joints and backs have opened up and the doors no longer close tightly.) Many of the collections are still housed in cardboard cartons, "Merrill boxes," which give inadequate protection to the specimens. And since an average of more than thirty thousand specimens are added to the Herbarium annually, a majority of the cases are overcrowded.

The need for modern herbarium cases became imperative, and so an application was made to the National Science Foundation for assistance in the purchase of such cases from its Facilities and Special Programs. The application was favorably received, and a grant of $88,800 has been awarded the Garden.

The financial value of a herbarium is surprisingly great. By the time a plant has been carefully selected and collected in the field, pressed and dried, identified and labeled, protected against predatory insects, mounted on a sheet of paper, and, finally, incorporated into an herbarium, its value

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*As the Museum and Administration Building was closed for rehabilitation during most of 1960 and 1961, the figures for these years are not representative.

Charles B. Harding, President, Mrs. Hermann G. Place, Vice President, Dr. William C. Steere, Director, and members of the staff of The New York Botanical Garden on the steps of the Museum and Administration Building with members of the Visiting Site Committee of National Science Foundation, June, 1962.

THE NORFOLK BOTANICAL GARDEN

By DOROTHY EBEL HANSELL

THE NORFOLK BOTANICAL GARDEN is in the making—buildings, bridges, canals, roads, gardens are under construction. It was interesting last April to see the work in progress; it was stimulating to feel the enthusiasm not only of the Director, Frederic Heutte, and his staff, but of the Mayor and other city officials, of the Garden's Advisory Committee, of the Tidewater area garden clubs and of the Old Dominion Horticultural Society. This is truly a great municipal adventure, an outgrowth of the famed Municipal Azalea and Camellia Gardens that were started on twenty-five acres of land in 1938 as a W.P.A. project. Two hundred and fifty Negro women were given work—they were employed to substitute for twenty-five men for heavy labor. These women pushed wheel-barrows of fill—four hundred and fifty cubic yards (one hundred and fifty truck loads) of fill—to erect a levee across a lake. This is only one of the Herculean tasks they performed in the early days of the Municipal Gardens. Some four thousand plants of azaleas, in fifteen varieties, and one thousand plants of *Rhododendron catawbiense* and *R. maximum* were set out. From this initial undertaking, the City eventually developed one hundred and twenty-five acres which surround a fifty-acre lake and are crisscrossed by twelve miles of footpaths and service roads.

During the passing years, Mr. Heutte never lost sight of his goal—a botanical garden for Norfolk. He dreamed about it, he talked about it, he planned for it and at last, in 1958, the Norfolk Botanical Garden became a reality when it was formally established by action of the City Council on February 18, with the support of the Old Dominion Horticultural Society. Seventy-five acres adjacent to the Municipal Gardens were set aside, and within the past four years $750,000 have been made available for the development of the Botanical Garden. (The Municipal Gardens are now part of the Botanical Garden proper.)

The objectives are to "provide for the people of Tidewater Virginia a garden which will always remain an inspiration and lead the home gardener to greater enjoyment of and accomplishment in his own garden" and to "provide actual and factual presentations of methods for growing plants under Tidewater conditions." The Norfolk Botanical Garden is intended to be "primarily an educational workshop." Plants will be grouped together, according to botanical practices, by genera and family, so that the plantings will become valuable to students of botany as well as to the gardening public. Labeling of the plants is being expedited by an engraving machine, the gift of the Old Dominion Horticultural Society.

The plantings of azaleas and rhododendrons have been augmented since the original plantings were made twenty-four years ago. There are over two hundred thousand azalea plants, representing one hundred varieties. In recent years attention has been given to building up the collection of rhododendrons. Some ten thousand plants include such spe-

A spring scene in the one-hundred-acre Municipal Azalea and Camellia Gardens, now part of the Norfolk Botanical Garden.

A Quonset hut served as the form for the arch of the stone bridge.

With construction completed, the land is prepared for planting.

cies as *R. carolinianum, R. catawbiense, R. fortunei, R. maximum, R. ponticum,* and *R. racemosum.* There is also a fine collection of Dexter Hybrids acquired from the Marshall Field Estate and the Arthur Hoyt Scott Horticultural Foundation at Swarthmore College; a number of plants raised from seed, received from the Rothschild Estate, of a special Exbury Strain; one hundred and fifty-six named hybrids, such as 'Pink Pearl', 'Bagshot Ruby', 'Bric-a-brac', 'Charles Bagley', 'Blue Peter', 'Goldsmith Yellow', 'Mme. de Bruin'; and most of the recent United States Department of Agriculture introductions.

One of the largest collections of camellias in the United States has been planted here. It numbers twenty-thousand plants in seven hundred and fifty varieties. Eleven species—*C. cuspidata, C. japonica, C. sasanqua, C. reticulata, C. saluensis, C. salicifolia, C. oleifera, C. hiemalis, C. vernalis, C. pitardii, C. maliflora, and C. granthamiana*—are represented.

Other plant collections are being assembled. A sizeable holly collection is still in the nursery stage. Captain R. W. Cross, who specializes in native plants and is an enthusiastic supporter of the Norfolk Botanical Garden, is accumulating a collection of plants from the Dismal Swamp which will be featured in a bog garden. The cacti and succulents that were collected by the Director, Mr. Heutte, on a trip to Arizona, New Mexico, and Texas in 1960 are being subjected to tests to determine whether they can endure the climatic conditions, particularly the humidity in Norfolk. Species and varieties of *Yucca, Opuntia, Agave, Aloë, Dasylirion, Echeveria, Crassula,* and others are being grown and those that pass the "endurance test" will be propagated for the Desert Garden that is planned to occupy five acres. Narcissi and tulips are planted by the thousands for spring effect,

Grass seed has been sown and shrubs are being planted around the cobblestone bridge over the canal.

Extensive excavating and soil-moving were necessary to transform flat land into an area with pleasing contours and to build a navigable canal. Insert. *Liriope muscari* is used as a groundcover.

and twenty-five thousand annuals for summer color.

Imagination and resourcefulness have been employed to the fullest extent in getting the Norfolk Botanic Garden under way, for its initial budget was modest. The execution of the stone bridge across the canal illustrates this point. It was designed and constructed by the Garden's own force, except for the driving of twelve thirty-foot piles to support any heavy weight that might cross it. The span was molded from a discarded Quonset hut and embedded in solid concrete. The retaining walls and abutments were constructed with over ten thousand granite blocks which once paved

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Work is progressing on the seven and a half acres that are being treated in the Versailles manner. From the observation tower there is an extensive water vista.

The view in front of the guest house at Mountain Garden of Tjibodas.

A scene, near the lake in Mountain Garden of Tjibodas.

MOUNTAIN GARDEN OF TJIBODAS

By RUSDY E. NASUTION

Mr. Rusdy has been employed in the Bogor Botanical Garden for the past three years. He contributed the following article in appreciation of the helpful information he has obtained from *The Garden Journal*, copies of which are sent to the library there.

AS IS GENERALLY KNOWN, the Bogor Botanical Garden* has many extensions in various parts of Indonesia. One of the extensions, established primarily for the purposes of acclimatizing subtropical plants, is the Mountain Garden of Tjibodas.

The Garden is situated on the slope of the twin volcanic mountains, Gedé-Pangrango in West-Java, at an altitude of about fifteen hundred meters (4,920 feet) above sea level. The area, covering about sixty hectares (one hundred and fifty acres) is in the ever wet tropics, with an average annual rainfall of thirteen hundred inches and an average temperature of 18°C (64°F.) It lies about forty-five kilometers (twenty-seven miles) south of Bogor and about one hundred kilometers (sixty-two miles or so) from Djakarta. It can be reached by car in about one and a half hours.

As we enter the grounds, we are greeted by the curious odor of *Melinis minutiflorus,* a grass which grows along each side of the path. Just beyond the entrance we are suddenly struck by the magnificent view over the whole Garden. In the foreground are well-maintained broad lawns; on the descending left side is a little artificial lake in which aquatic plants grow; in the background a straight stone-paved avenue is planted on both sides with *Araucaria bidwillii* and *A. cunninghamii.* These araucarias, native to Australia, were introduced to Indonesia some years ago; according to van Steenis (*Flora Malesiana,* 1953) they were planted in the Garden in 1866.

At the south end of this avenue there is a guest house, which contains five guest rooms, a library, a dining-room, a conversation room, and an administration office. These accommodations are provided especially for official guests who stay at the Garden to engage in scientific work.

As we climb up to the east part of the Garden, we reach the Laboratory which was established in 1952. This has four workrooms, four guest rooms, a dark room, and space for library, zoological exhibits, and herbarium.

Not far from here, as we climb down in a northerly direction, we come upon a very fine collection of *Eucalyptus.* These large trees, about fifty meters (one hundred and fifty feet) tall, with abundant foliage at their tops, were imported to Indonesia from Australia by F. von Mueller.

In the glasshouse, many kinds of cacti, gloxinias, and begonias grow well and produce their flowers freely. The gloxinias, which are especially beautiful, bear as many as thirty flowers in a single pot. Some of the cacti attain a height of three meters (about ten feet).

The most important part of the Mountain Garden of Tjibodas is the forest reserve, a virgin tropical mountain forest through which paths have been laid out. It was the late Dr. S. H. Koorders, forest botanist, who named and labeled some hundreds of important trees in the reserve between the years 1898 and 1903. These trees are located in an area of about two hundred and fifty hectares (over six hundred acres). The result of his work was published by Dr. M. L. A. Bruggeman in *Bulletin du Jardin Botanique de Buitenzorg,* Series III, Vol. IX, 1927-1928. It has been of great assistance to botanists who come to study the tropical mountain flora, and particularly those who are planning an expedition into the jungle.

Visitors upon entering such a virgin forest for the first time are impressed, almost awed by the many kinds of plants—trees, shrubs, lianas, and ephiphytes; together they make a dense, impenetrable forest. One of the trees that dominate this vegetation is *Altingia excelsa.* It has a big, tall trunk, often reaching a height of forty meters (one hundred and thirty feet or so), and carries its branches far above the ground. Other prominent trees are the chestnuts; among them are *Castanopsis javanica, C. argentea,* and *C. tunggu-*

*Formerly the Buitenzorg Botanic Garden.

Within the jungle of the nature reserve at Tjibodas.

rut of the *Fagaceae* or Beech Family. They often reach thirty meters (almost one hundred feet) high. On their branches hang the green *Usnea.*

A little farther within the forest the vegetation is dominated by *Podocarpus imbricatus*, often attaining a height of thirty meters and having a large, strong trunk.

Among the members of the Palm Family, *Plectocomia elongata* is distinguished. It has a very long stem which climbs on trees. The young stems have a thin film of wax, and the young leaves are covered with powder.

Besides the rich tropical vegetation which interests visitors, the Tjibeureum Waterfall also commands attention. It is located in a beautiful spot and can be reached in an hour's walk up the slope of the Gedé volcano. Actually, the Tjibeureum Waterfall consists of three falls coming down from the rock wall. The left is the largest, the middle the highest, about forty meters (one hundred and thirty feet). Among the fascinating plants of this locale are different species of *Nepenthes;* some are ephiphytes, some are terrestrials. The "pitchers" of the latter are often buried in moss, and insects creeping over the ground are thus easily trapped.

After a four-hour walk, we reach the active crater of Gedé. On the way up, at an altitude of twenty-five hundred meters (about eighty-two hundred feet), we find a hot spring coming from a rock. A little nearer to the crater, the vegetation distinctly changes—the trees are shorter and most of the trunks are moss-covered. Ephiphytes also grow nearer to the ground, and groundcovers are sparser. The most commonly seen plants around the crater belong to the *Ericaceae* or Heath Family, such as *Vaccinium* and *Gaultheria. Albizzia montana, Dianella javanica,* and *Anaphalis javanica* are also very often found.

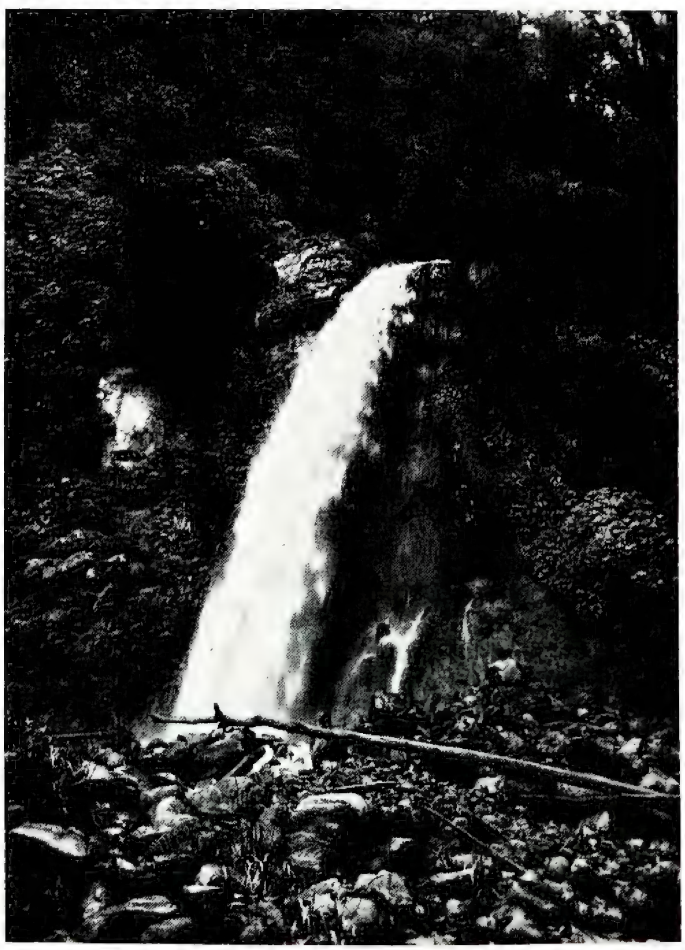
NORFOLK BOTANICAL GARDEN (Continued from page 20)

the streets of Norfolk. The banks of the canal and the approach to the bridge are being planted to anchor them and to furnish a colorful sight. (They are watered by mist irrigation to keep the maintenance cost at a minimum.)

Over one hundred and fifty thousand cubic yards of soil were moved to transform flat terrain into one with pleasing undulations and contours and to create a navigable canal. Santolina, crape-myrtle, oleander, hibiscus, and hollies and other broad-leaved evergreens are being planted en masse. One of the principal undulations is the Hill of Nations and a bridge leading to it called Nato Bridge, so named in honor of Norfolk's part in this organization of fifteen countries. A carload—forty tons—of "feather rock," a light volcanic rock, was transported from California because it is so easy to handle. It is being used to build a cascade and waterfall on the canal side of the Hill of Nations.

From the observation tower on the Hill of Nations there will be a one-thousand–foot overland vista opening on to a twenty-five-hundred–foot water view and a distant view of the Amphibious Naval Base. D. E. Caldwell, Director of the Arts Museum, suggested that statues of heroic periods in naval history flank the vista. A logical outcome of this suggestion was to treat this part of the Norfolk Botanical Garden in the Versailles manner. There will be five rows of trees on each side, the center row being of Darlington oak (*Quercus darlingtoniana*), a live oak of symmetrical habit. The specimens forming the midrib of this oak planting will be allowed to attain thirty feet in height near the observation tower and twenty feet in height at the opposite end. These will be flanked by a row of small-leaved European lindens, the type that is being raised at the Garden, from seed collected in and around Norfolk, and that is of slow and compact growth. Hopa crab-apples and crape-myrtles will be planted on the outer side of the lindens. Within the vista there will be a row of camellias, the variety 'Lady Vansittart' alternating with the variety 'Mrs. Lyman Clarke', interspersed with azalea 'Formosa'. Between the camellia-

Tjibereum Waterfall in the volcanic Gedé Mountain.



azalea planting and the linden trees a row of Japanese black pine, *Pinus thunbergii,* has been placed. It is expected that the pines will gradually arch over the camellias and azaleas. The center panel of grass is fifty feet wide at the observation platform and narrows to thirty feet at the water's edge —this intensifies its length of more than a thousand feet. As time passes, the rows of trees and shrubs will develop and intermingle, accentuating the effect of mass plantings. The addition of dwarf blue spruce will tie the ribbon-like plantings to the ground.

The plans call for a fountain, emitting one hundred jets of water, to be situated at the far end, approximately one mile from the observation platform. The total area of the vista in the Versailles manner is seven and a half acres.

This will be only one of the features of the Norfolk Botanical Garden, for other gardens are being planned for the future: the bog garden has already been mentioned, and funds for a Colonial Garden have been contributed by the Norfolk Garden Club. The plans call for a unique display of roses: instead of one large rose garden, nineteen rose gardens have been designed, varying from a small garden of less than fifty roses to one of more than five hundred bushes. Some are formal in design, other informal, each being conceived as a memorial garden.

Mr. Heutte said, "Building a botanical garden is not sufficient. We must train personnel to assure its continuing progress. We plan to develop a training program* patterned after that of famous botanical gardens. The preliminary plans were discussed with L. W. Webb, President of William and Mary at Norfolk, which recently became a fully accredited four-year college and was renamed Old Dominion College, and with Park Brinkley, Commissioner of Agriculture of the State of Virginia. Both were receptive to the idea and expressed their willingness to aid in establishing the training program." There is a possibility of linking the college and the Botanical Garden in horticultural and botanical courses, and thus the Norfolk Botanical Garden would be a place of great beauty and of educational value.

*The in-service training program is now (November, 1962) under way, with thirty-three men enrolled.

THE GARDEN'S HERBARIUM (Continued from page 17)

in terms of the actual cost in today's high labor market will be three dollars at the very least. Although a herbarium of the size of that at The New York Botanical Garden thus represents a multimillion-dollar research tool, its real value lies in its scientific importance to the hundreds of graduate students and research scientists who use it now or will use it a century from now.

Some of the collections in the Garden's Herbarium have been increasing in value for about one hundred and fifty years. The curators of the present generation serve as custodians of collections which must be preserved as carefully as possible for passing to the custody of future generations of botanists. It is particularly important in taxonomy to preserve the historical materials with the greatest of care, because it is to these materials that botanists must turn constantly for answers to present-day questions. A major herbarium may therefore be regarded as a national, or indeed an international, biological heritage.

LIFE STORY OF A FERN (Continued from page 14)

hundreds of swimming gametes must be released from their domes, for most of them fail to find the other kind of gamete. Finally the zygote must slowly grow from its small beginning, exposed from the first to dangerous variations in temperature, light, and moisture.

The flowering plant compresses all this sequence into the formation of its seeds, concealed within the fruits. When the seed is liberated, a small plant, carefully wrapped and well rationed with reserve food, is already formed and ready to continue its growth under the proper conditions—or to remain dormant but living through improper conditions. It is small wonder that growers of ferns are only occasionally concerned with spores, prothallus, and gametes, but rely more often on the separation of the underground stems and other methods of vegetative propagation.

SEMPERVIVUMS (Continued from page 4)

W. E. Th. Ingwersen, along with other members of the Alpine Garden Society, were on a collecting expedition in the Balkans, and while climbing Mt. Peristeri in Macedonia, they left the track to collect a *Ranunculus* sp. growing nearby. While Mr. Ingwersen collected, Dr. Seligman searched some outcropping rocks and there he found an unusual sempervivum, later named *S. octopodes* Turrill. The small, rounded, semi-open rosettes appear to be delicately perched on the ground. Its leaves are stubby and densely hairy, golden-green with a very dark brown apex. The offsets, given off generously, have large slender stolons which radiate around the plant and are often as long as three inches.

Another similar and unusual Balkan species is *S. ciliosum* Craib. The gray, globular rosette is about one to two inches across, and the leaves, tightly incurved, give the rosette a flattened appearance. Individually the leaves are light green with red on the reverse of the mature ones, but so densely hairy on all surfaces that the hairs interweave around the rosette, producing the gray sheen.

Sempervivum erythraeum Velonovsky forms compact tufts of flat, wide-open rosettes. Its short leaves are a delicate grayish red-purple, enhanced by the "bloom", or extremely fine indumentum, a characteristic indicating the plant does not want too much moisture.

No mention of the Balkan sempervivums would be complete without reference to *S. heuffelii* Schott, the most common species of the Balkan Peninsula. This strong, solid-looking plant has been under cultivation for many years. It resembles *S. tectorum* in coloration, and the color combinations are equally variable. The leaves are broad, coming abruptly to a point. No stolons are produced carrying young offsets; the rosettes themselves divide symmetrically on the same rootstock, producing a solid, compact mass.

There are several ways of growing sempervivums—the way the individual feels about them usually determines how it is done. They are very effectively planted in the rock garden, where they flourish and look natural in the crevices. They are also ornamental when planted in dry stone walls. Sempervivums can be used to advantage even in the largest gardens, as they are in the well-known garden of Mr. and Mrs. Leonard Buck in Far Hills, New Jersey. In this garden

(Continued on page 36)

CONVERSATIONS ON ECOLOGY

The Garden Journal inaugurates, with this issue, a new department which will concern itself with ecological questions. Dr. Pierre Dansereau, Assistant Director (Botany) of the New York Botanical Garden, and head of its Department of Ecology, proposes to carry on an exchange of ideas with other ecologists in an informal way. The comments of readers will be most welcome and may occasionally also be published. Since ecology is such a wide field, attention will be focused upon a single topic each year. In 1963, the subject is *vegetation management*, a science which is very much in the making, and on which the limelight has recently been cast by Rachel Carson's *Silent Spring*. Dr. Dansereau presents herewith some reflexions on this theme and addresses them to Dr. Frank Egler (Aton Forest, Norfolk, Connecticut) who, it is hoped, will provide a reply in our next issue.

Dear Frank:

As I read Rachel Carson's *Silent Spring*,[1] I often thought of you, not only because the author quoted you frequently, but because I was so pleased to see some of the warnings you have been sounding receive such an impressive echo.

There have been so many reviews of Carson's book, that I cannot begin to quote them, even less to digest them. It seems to me, however, that most of the adverse criticism is already refuted in the book itself. It is not unexpected that much adverse criticism comes from quarters very close to the chemical industries. Without casting undue suspicion upon the motives of the sales promoters of pesticides, one is not inclined to trust their detachment. And this misgiving is confirmed when the critics make the author say what she has not even implied.

One reviewer, among many others who think that this book is important, labels it "the revolt of the ecologists." It is high time, he thinks (and so do I and so do you), that our voice be heard in public places. We have hoped, at various times (in our now lengthening career), that our generation would be getting away from the more sentimental forms of conservation to move into the realm of vegetation management[2] and resource administration.[3] Many useful steps have been taken in this direction, of course, in these days when the military and the physical scientists are developing the new field of biological engineering. Who better than we can tell them what to look for?

When this happens, however, as with Miss Carson, our "scientia amabilis" becomes a "scientia terribilis" and the innocent bog-trotter, tree-measurer, and quadrat-maker a dangerous revolutionary.

There is no denying that we find ourselves in the same boat (if you do not mind leaving the terrestrial habitat for the aquatic) with those who alarm us by news that radiation is poisoning our lives and maybe that of several generations to come. Thalidomide and DDT are certainly part of the same scheme, not to say suicidal conspiracy, as nuclear warfare. What kind of a world do we want? We cannot just let things happen, we cannot allow some of our activities (whether agricultural yields or military defense) to endanger our most vital social needs and ultimately to imperil our very survival, individual and collective.

Nothing will meet this self-challenge of mankind, it seems to me, but careful planning, nothing but an austere reduction of some initiatives which have too free and dangerous a sway, at this time. It is hard to estimate whether the economic or the political obstacles are the greatest. In some parts of the world it is firmly believed that North American political power is levered by finance and industry (mythically referred to as "Wall Street" and "Big Business"). Our image of ourselves is quite different, of course, and our view of some of our neighbors is strongly colored by apprehensions of the effects of state control.

Whatever our choices as private citizens in these political alternatives, it may well be that our most urgent duty is to enlighten ourselves and others on the technical aspect of modern man's exploitation of the universe so as not to permit an unwarranted use of scientific findings. We have the knowledge and training (if not always the curiosity and motivation) that allows us a better grasp than others have of cosmic and genetic gravitations. The milky way and the DNA spirals, natural selection and food-chain cycles, are in the background of our emerging science of ecology.

A few ecologists, like you Frank, since the beginning of their career have not been content with an impatient treading of unbroken ground, challenging established principles, and tentatively substituting new ones; they have made a repeated attempt to apply ecological discoveries to human affairs. (Of course, we have as yet no definitive synthesis of human ecology: most attempts being heavily weighted to conservation, sociology, or economics.)

But certainly a heavy burden rests upon our shoulders to interpret environment under all of its aspects—a burden as heavy as that of the nuclear physicists who are providing new means of harnessing and releasing energy. In fact, it is the very same task, as we are beginning to see more and more clearly (have you read David Gates' excellent little book?[4]). Our basic tenet, I suppose, is that no rational exploitation of the universe around us (or more immediately of the vegetation around us) is possible if we do not understand the shifting balances of living communities. It is neither here nor there whether some of us might wish to restore the world to its pristine equilibrium, or whether we are content to preserve some examples thereof as museum pieces. If we do consent to engage into irreversible processes, we must do so with our eyes open, not unwittingly.

Rachel Carson makes this clear, I think. She has painted a picture of the world as we have transformed it and she has pointed to the direction in which we are headed. The "spray around us" (surely it is you who have coined this phrase) has suddenly become visible. Miss Carson writes so well and so clearly that no one may misunderstand. That lovely voice, however, has the harsh accents of Cassandra.

To escape our doom, what can we do? Do you really believe that biological control can work on a large scale? By what margin will our standard of living be reduced if we substantially curtail spraying? What answers does vegetation management offer? What is the conscience-stricken gardener to do, when nozzle in hand, he pauses before applying DDT? Can we really teach him to control weeds by other means? Do we now have that kind of knowledge or must we make a strong plea for more research?

Cordially,
Pierre Dansereau

[1] Rachel Carson. Silent Spring. Houghton-Mifflin, 368 pp. 1962.
[2] Frank E. Egler. Selective application of selective herbicides in the study of vegetation development. Science, 115(2978):98-99. 1952. — Science, industry, and the abuse of rights of way. Science, 127(3298): 573-580. 1958.
[3] Pierre Dansereau. Resource planning: a problem in communication. IN: "Science and the Future of Mankind," W. Junk, Den Haag, pp. 131-140. 1961.
[4] David Gates. Energy exchange in the biosphere. Harper & Row Biological Monographs, 151 pp. 1962.

INTERNATIONAL HORTICULTURAL EXPOSITION HAMBURG, GERMANY

By BEATE HAHN

Mrs. Hahn was born in Germany, the daughter of Professor J. Jastrow of Berlin. For five years after her graduation from the Horticultural College, Marienfelde, North Berlin, until her marriage to Dr. Franz Hahn, an engineer and an expert on scientific management, she was head gardener of three large estates. In 1923 Mrs. Hahn built a model garden for the children of the steelworkers of Hahnsche Werks near Düsseldorf (her husband was the grandson of the founder) and between that year and 1938 she added a garden center with horticultural library, an office for free horticultural advice, and two large vegetable gardens that supplied the plant's cafeterias. A full-time gardener was added to the staff.

In 1939 Mrs. Hahn took a twenty-thousand-mile trip through the United States to visit gardens, and in the following year began to establish her own gardens, "Heathview," in Wolfboro, New Hampshire. She did research on soilless culture and on the hybridization of the sunflower, raised vegetables for the market during World War II, and instructed in vegetable gardening. She also taught gardening, theoretically and practically, to children aged two and a half to eighteen at a co-ed camp. The greater part of her life has been devoted to gardening for children—not only teaching gardening to them, but lecturing about this activity for them, and writing books about it. One of her books is *Der Kindergarten—Ein Garten der Kinder* (a textbook published in Switzerland). A recent book is *Gärten für die Jugend—mit der Jugend,* and another book is in preparation.

For her work in children's gardening and in community gardening, she has been cited by the Federated Garden Clubs of New Hampshire and the National Council of Garden Clubs and was made an honorary member of the American Horticultural Society.

Mrs. Hahn is the American representative of the International Hamburg Exposition. In October she attended a press conference in Hamburg, also a meeting of the German Horticultural Society of which she is a member.

CHANGES IN GARDENING and landscaping abroad can best be observed at national and international exhibitions. Held before World War II and since resumed, these are financed by the organizations of fruit, vegetable, and flower growers and by the state and city in which they are held. The exhibition in Dortmund, Germany, in 1959 extended over an area of two hundred and forty acres. When the exhibition closed, most of the greens, the flower beds, and the buildings became the property of the city.

A view from the bridge that is being erected for the International Horticultural Exposition in Hamburg. The walls of concrete are the foundations for beautiful fountains. At left are special plantings of trees to conceal the prison.

This year the International Horticultural Exposition will be held in Hamburg, stretching over an area of seven hundred and sixty thousand square meters. When it closes, it will become Hamburg's "green belt." City planning is part of this project—the old Botanic Garden and the Alster River are being included in the exhibition grounds.

Fifteen years ago, when walking through the streets of London, Berlin, Nueremberg, or some Italian town, one still had to climb over ashes, rubble, and other debris. Wherever he walked, he was aware of the damage inflicted by World War II.

Suddenly there was spring 1951. Grass became green; meadows were bright with wild flowers; out of the ruins came little children, still clad in miserable clothes and torn shoes, clutching small bouquets of wild daisies and yellow primroses. People looked happier even in such poor surroundings, because the sun was warming them and they were once again enjoying the benefits of nature. Joy in life was renewed, and a new approach towards gardening and landscaping was developing.

Indoor gardening was stimulated through the increased importation of new plants from foreign countries. With the better plants, new methods of raising them were worked out. In 1953 I saw reconstructed schools with long plant beds installed in their assembly halls. Day nurseries in Munich and Hamburg were equipped for teaching gardening indoors—the garden departments in both cities regularly exchanged the necessary plant materials.

While soilless culture was being used during World War II on Volcanic Island in the Pacific to obtain plants for needed nutrition, Switzerland and Germany also developed methods of raising plants without soil. The electric company of Luzerne, Switzerland, conducted research for some years; finally a book on soilless culture on a scientific basis was published by the University of Zurich. Shortly thereafter commercial greenhouses adopted these methods, and beautiful plants came on the market; even cacti and succulents were raised without soil in special greenhouses and produced flowers of unusual size and beauty. Containers were designed for growing house plants in homes and hotels. A new method of soilless culture was shown for the first time at the Swiss Horticultural Exhibition in Zurich in 1959. Two wooden frames, covered with chicken wire, were placed closely together in flower boxes. Plants, inserted in moss, were put in the various holes, and a chemical solution was poured over the moss. The Eternit Company brought out walls four feet wide and six feet high in which were holes for growing such plants as begonias, nasturtiums, and ageratum. These walls made a beautiful decoration for roof gardens, and they certainly lightened the work.

Growing plants in containers—this has been done in Italy and Spain and elsewhere for many years—came into vogue in Switzerland and Germany during the last ten years. The containers, mostly earthenware, are often hand-made and of beautiful forms. Here, too, the Eternit Company took the initiative in developing very light and winter-proof containers. It matters not in what European country one visits, or how small the community is, one will see beautiful

A tremendous amount of excavating has been done, and thousands of cubic yards of soil have been moved in preparation for the Exposition. Two new bridges have been constructed to control traffic and enable visitors to walk around the Exposition grounds leisurely.

Above. Japanese irises (*Iris kaempferi*) have been planted in special beds for the International Horticultural Exposition.

Right. This is one of the attractive rest areas that is being provided for the comfort of visitors. The easy chairs, woven with colorful plastic strings, add a festive touch.

containers planted with exquisite taste and well cared for.

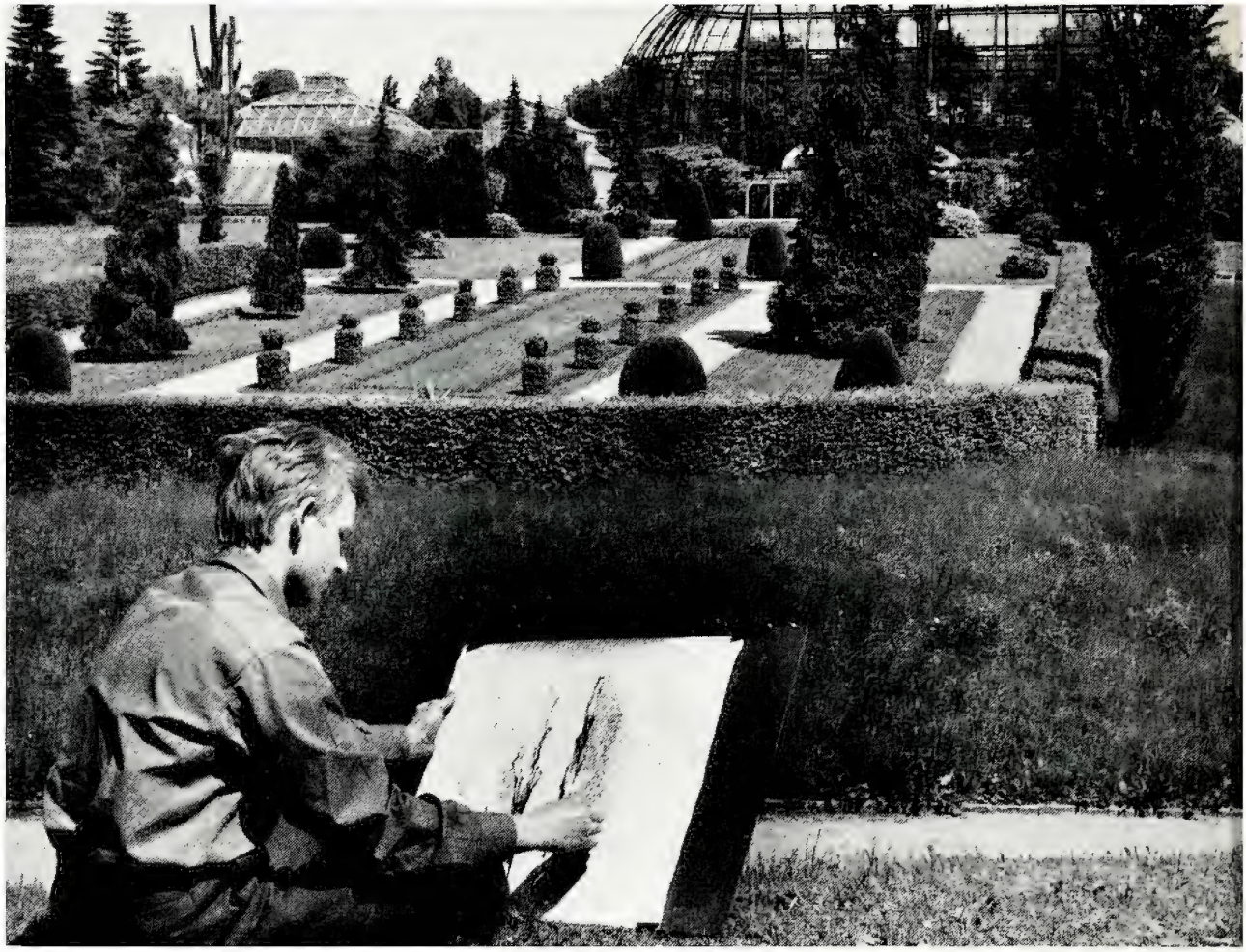
Tools have been invented during recent years to make garden work easier and to take less time. Mobile greenhouses, which may seem to be a novelty, are used. With such a greenhouse, a grower who formerly raised tomatoes, cucumbers, or flowers on the floor of his greenhouse and not in an elevated bed, or bench, can move the mobile greenhouse, equipped with pipes, the moment certain plants no longer need special heat or other special growing conditions to another section for starting new crops of vegetables, fruits, or flowers.

What is the present trend in European landscape gardening? It follows the pattern set by modern architecture, and a regular, more contrived lay-out has developed. The so-called "Garden to Live in" is the current mode. This type of garden harmoniously brings together a shady sitting area, flower beds, lawns for relaxation, a playground, a kitchen garden, or an area for fruit trees. The design varies according to the owner's taste and interest and the size of his property. A rock garden, a pool, retaining walls, terraces, flagstone paths, trellises, arbors, a badminton or boccia court may be added. The fundamental design, however, of "Garden to Live in" remains, and house and garden are closely united.

After the war, special attention was given to restoring playgrounds and building new ones. These helped, on the one hand, to keep children off the streets and out of the ruins and at the same time answered the demands of modern education. The idea of the "adventure" playground or Robinson playground, where children could play and work creatively originated in Denmark. They were given material to erect small huts and old cars to drive. Switzerland adopted the idea, and the well-known Swiss organization Pro Juventute founded a remarkable number of Robinson playgrounds in Zurich. Florence built a miniature traffic playground, with underpaths and bridges on the Arno River; another one was made in Stuttgart, Germany. With bicycles, scooters, and little motor cars children learn the traffic laws while they play. Playground equipment of novel shapes was created; a forester designed wooden (no splinters involved) horses, deer, and other animals for riding and climbing on. Düsseldorf established playgrounds where children could enjoy fountains and wading pools without danger. Munich made use of the rubble by transporting it outside the city for a "mountain", one hundred feet high, for coasting and skiing. Not long afterwards, Berlin followed this original example. Hamburg is famous for its modern playgrounds, and a Robinson playground will be part of the Horticultural Exposition.

These modern playgrounds are usually surrounded by trees and shrubs and boast of flower beds. Some playgrounds have plants growing in containers, many have lawns on which the children are permitted to play. I have taught gardening to playground supervisors.

1938 marks the time when the very first garden for the blind was built—in the town of Exeter, England. An inspector watched two women as they strolled through a park; one of the women took a leaf from a fragrant plant and moved it across her face, seemingly pleased as she did so. The inspector realized that the woman was blind. He discussed the incident with his colleagues and with members of his community, arousing their interest and sympathy, and thus the first garden for the blind came to be made. Since then one garden after another has been laid out in England, small ones and larger ones; from England the idea has spread to the United States and Canada, and now there are gardens for the blind in many countries around the world. Vienna opened one in 1959 in Wertheimstein Park; it is large and especially well planned. Another beautifully planned garden for the blind is in The Hague. Switzerland recently opened one near Luzerne. Finland has a school for blind children who receive exceptionally good training in



An artist uses the specimens in the formal evergreen garden of the Botanical Garden in Berlin as models for a sketch. The large palmhouse in the background is being reconstructed. Lower right. A walk in the Botanical Garden in Berlin, in the section devoted to flowering trees.

gardening. Gardening is also taught in homes for the blind in Germany.

Gardening and landscape architecture cannot be discussed without mentioning the objectives and the work of the city planners. The German Horticultural Society under the presidency of Count Lennart Bernadotte has taken definite steps toward conservation and beautification. The Society's slogan is "Gardening for Mankind," and the "Green Charta of the Mainau," developed through the cooperation of the secretaries of the states, horticulturists, landscape architects, and professors of city planning, is aimed at opening the eyes of the public to everyone's right to live under healthy conditions. In the meantime, the Horticultural Society has started a drive throughout the country—so far it has met with successful response—under the slogan of "Our village should become more beautiful."

Forty-four countries have accepted the invitation to participate in the International Horticultural Exposition that opens in Hamburg this April. James Rose, one of America's well-known landscape architects, has designed a special garden. The program promises indoor as well as outdoor displays, flower arrangement exhibits, and conferences. A special conference has been called by Count Bernadotte to bring together the presidents of horticultural societies from all over the world.

These European exhibitions are not only beautiful to behold, but they offer such gaiety—the gaiety of happy gardeners and plant lovers as they walk around, admiring trees and shrubs and flowers. Truly these international exhibitions are plantsmen's contribution toward world peace and unification.

BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

BIOGRAPHY AND EXPLORATION

ANDRÉ LE NOTRE—GARDEN ARCHITECT TO KINGS. Fox, Helen M. 176 pages, illustrated (part colored), bibliography, indexed. (A Chanticleer Press edition) Crown Publishers, New York. 1962. $7.50.

The pen of a distinguished American gardener and author is responsible for this sensitive and sympathetic treatment of the life and work of the greatest landscape architect of France. Although nearly three centuries separate the lives of subject and author, the verities that support a deep understanding of honest and creative landscape design are apparent in the thinking of both. It is fortunate and meet that this evaluation of Le Nôtre has been prepared for an English-reading public by one so well versed in the garden history of France. Now we are led to appreciate and admire the more the genius of one of the most distinguished artists of the seventeenth century. Now will Versailles, the Tuileries, and the Champs Elysées, yes, and even Chatsworth, Bushey Park, and St. James Park in England, be seen from new vantage. Now will the magnificent importance that they imply of man's domination over nature be understood the better.

Mrs. Fox writes delightfully with a free and easy-to-read and easy-to-learn-from literary style. The book itself is goodlooking and clearly printed in type of a size and face comfortable to read. The illustrations, color, line and photographic, are well chosen and well reproduced. The photographs show that delightful softness characteristic of the offset process but, as always with reproductions done by this technique, exhibit less fine detail than that of good halftones. This is a valuable addition to the literature of gardening, a fine book for one's library and to give to one's friends.

LETTERS OF THE LEWIS AND CLARK EXPEDITION WITH RELATED DOCUMENTS: 1783-1854. Jackson, Donald, ed. 728 pages, illustrated, bibliography, indexed. University of Illinois Press, Urbana, 1962. $10.00.

The new, hitherto unpublished material incorporated in this work makes it of tremendous importance. Of particular interest are the letters of Thomas Jefferson that show his intimate knowledge of the details of this famous expedition.

MORE LIVES THAN ONE. Krutch, Joseph Wood. 387 pages, indexed. William Sloane Associates, New York. 1962. $5.00.

An autobiography which reveals the remarkable versatility of one who has gained renown, as a teacher, drama and book critic, philosopher, and naturalist-writer. In recent years, from his den in Arizona, have come such gems as: *The Voice of the Desert, The Grand Canyon,* and *The Forgotten Peninsula.*

GENERAL GARDENING

"AMATEUR GARDENING" PHOTO ALBUM OF GARDEN PLANTS. Hellyer, A. G. L., comp. Notes by Christopher Lloyd. 192 pages, illustrated, indexed. Transatlantic Arts, Hollywood-by-the-Sea, Fla. 1962. $5.25.

Accompanying the seven hundred and fifty photographs of garden plants (cultivated in British gardens), that were selected by the Editor of the English periodical *Amateur Gardening*, are brief descriptive and cultural notes by Christopher Lloyd, a recognized horticultural authority, the author of *The Mixed Border* (1957).

GARDENING MANUAL. Frederick, Mrs. V. R., Mrs. William H. Pavey, and Victor H. Ries, eds. 167 pages, illustrated, bibliography, indexed. The Ohio Assoc. of Garden Clubs, Inc., Urbana, Ohio. 1962. spiral, $3.00.

A comprehensive, basic, horticultural guide, useful for beginners as well as for those who are more advanced in gardening craft. Particularly helpful and clearly written is the chapter on soils and fertilizers. Specific blooming dates are given for Central Ohio.

SPECIAL KINDS OF PLANTS AND GARDENS

HOW TO GROW AND USE BULBS. Sunset Editorial Staff. 120 pages, illustrated (part colored), indexed. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. paper, $1.95.

Here are the answers to what and which are bulbs, bulblets, corms, rhizomes, tubers, tuberous rhizomes or rootstocks, tuberous or thickened roots? Numerous phases and procedures of bulb culture, both indoors and out, are discussed. Tabulations provide quick reference-aids for blooming dates, planting times, measures of depths and distances apart.

HOW TO GROW AND USE CAMELLIAS, rev. ed. Elitorial Staffs of Sunset Books and Sunset Magazine. 88 pages, illustrated (part colored), indexed. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.95.

A new edition, beginning with an introduction by David L. Feathers, Past Director of the American Camellia Society, and ending with "A Camellia Encyclopedia," with descriptions of over seven hundred varieties. A special chapter is devoted to bonsai camellias.

MANAGEMENT OF ARTIFICIAL LAKES AND PONDS. Bennett, George W. 283 pages, illustrated, bibliographies, indexed. (Reinhold Books in the Biological Sciences Series) Reinhold Publishing Corp., New York. 1962. $8.00.

This is a general reference book for the professional fishery biologist and for those who are concerned with lake- and fish-management problems. The section devoted to aquatic vegetation and control measures should interest home owners whose properties include small ponds and lakes.

PUBLIC GARDENS AND ARBORETUMS OF THE UNITED STATES. Roberts, Martha M. 148 pages, illustrated (part colored), indexed. Holt, Rinehart and Winston. New York, 1962. $7.50.

Miss Roberts, as author and photographer, skillfully presents seventy-one of America's noteworthy public gardens and arboretums. In her travels from coast to coast, through twenty-six states, she covered over thirty-five thousand miles. With each garden pictured she offers useful historical background notes.

ROSES. Coats, Peter. 128 pages, illustrated (part colored). (Pleasures and Treasures) G. P. Putnam's Sons, New York. 1962. $3.95.

Distinctive in text, format, and illustrations is this well-written little book on the history of the rose. A remarkable selection of pictures gleaned from rare old paintings and books.

WATER GARDENS. Perry, Frances. 169 pages, illustrated, indexed. (Penguin Handbooks PH 82) Houghton Mifflin Co., Boston. 1962. Paper, $1.95.

A concise, well-illustrated text on the culture of water and bog plants and the construction and maintenance of small ponds and pools by an English nurserywoman who has extensive experience with aquatics.

THE WORLD OF ROSES. Park, Bertram. 162 pages, colored illustrations. E. P. Dutton and Co., New York. 1962. $12.50, up to Jan. 1, 1963; thereafter, $15.00.

242 color reproductions of rose varieties (recipients of international awards) including a dozen views of famous rose gardens, one of which is American. The text consists of a brief historical introduction and descriptions of the roses and gardens pictured. The color plates are on a par with good-quality nursery catalogs.

GARDEN FURNITURE

FURNITURE YOU CAN BUILD. Editorial Staffs of Sunset Books and Sunset Magazine. 128 pages, illustrated. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.95.

Garden-minded carpenters will find a sizeable section in this book devoted to outdoor furniture—garden and patio chairs, benches, seats, and tables. The full working drawings, lumber tables, and furniture building tips are useful features.

GARDEN HISTORY

GARDENS. Hadfield, Miles. 128 pages, illustrated (part colored). (Pleasures and Treasures) G. P. Putnam's Sons, New York. 1962. $3.95.

Here is a most entrancing little history of landscape gardening, magnificently illustrated by photographs of contemporary gardens and reproductions of famous old paintings and prints. Intriguing chapter headings include: "Italy and Beyond"; "France and Le Nôtre"; "The Gothic North"; "Oriental Interlude"; "Le Jardin Anglais"; "Nineteenth-Century Variety"; and "Greenhouses and Alpine Gardens."

BONSAI

BONSAI: DWARFING TREES IN THE MODERN MANNER. Aske, Gladys. 10 pages, 34 plates. Published by the Author, 516 Crystal Road, St. Helena, Cal. 1962. paper, $1.95.

Brief notes on bonsai techniques with practical cultural directions. Many of the photographs included are of old and valuable dwarfed trees from the collection of Daniel Buckley, Past President of the American Bonsai Association.

TREES AND SHRUBS

THE BOOK OF TREES, 2nd ed. Grimm, William C. 487 pages, illustrated, bibliography, indexed. The Stackpole Co., Harrisburg. 1962. $10.00.

To this revised and enlarged edition have been added forty large shrubs and small trees and twenty-two "introduced" trees, and the scope of the original work has been greatly broadened. The author states that "this is the first time that a popular book on tree classification has completely covered both northern and southern trees." A most informative tree guide, similar in format to *The Book of Shrubs* (1957).

THE STUDY OF TREES MADE SIMPLE. Russell, Solveig P. 159 pages, illustrated. (Made Simple Books) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

Easily assimilated facts on the morphology and physiology of trees with good descriptive notes showing distinguishing characteristics of each species and variety selected. Excellent drawings by Charles C. Clare, Jr. of The New York Botanical Garden.

FLOWER ARRANGEMENTS

BEST OF SHOW IN FLOWER ARRANGEMENTS: TRI-COLOR, AWARD OF DISTINCTION AND BLUE RIBBON WINNERS FROM TOP SHOWS OF AMERICA. (A Margaret Harold Publication) Allied Publications, Nashville, Tenn. Book I and II. 1961, 1962. Each, paper, $1.95.

A fascinating annual, small folio in size, now in its second year. The selection of the prize arrangements has been made by Margaret Harold. With each picture is a photograph of the winner-arranger, the names of the judges, and notes on the plant materials and containers depicted.

CONTEMPORARY FLOWER ARRANGEMENT, rev. and enlarged. Golden, Rae L. 127, S31 pages, illustrated (part colored), indexed. Hearthside Press, New York. 1962. $4.95.

The first edition of this title, published in 1955, has been on the reading list of the Flower Show Schools of the National Council of State Garden Clubs. This new edition includes a supplement, entitled "Workbook of Containers, Stands and Mechanics," which is also published as a separate volume at $2.50.

THE FLOWER ARRANGEMENT CALENDAR: 1963. Wilson, Helen Van Pelt. Unpaged, illustrated. William Morrow and Co., New York. 1962. Plastic binding, $1.50.

The seventeenth edition of this appointment book maintains the high standards of photography and arrangements of previous years.

FLOWER ARRANGEMENTS. Piehler, Mrs. Howard J. and Mrs. Edward R. Ray. 72 pages, illustated. Ohio Assoc. of Gaden Clubs, Urbana, 1962. paper, $2.00.

Over one hundred photographs of flower arrangements with descriptive captions, the first of a series of flower arrangement booklets to be published by the Ohio Association of Garden Clubs.

FLOWER ARRANGEMENTS FOR SPECIAL OCCASIONS. Amer, Jean B. 128 pages, illustrated (part colored). (A Margaret Harold Publication) Allied Publications, Nashville, Tenn. 1962. $4.95.

Festive flower arrangements, numbering over one hundred, are illustrated and described in detail, with menus and recipes for numerous holiday, anniversary, and other special occasions.

MANUAL FOR FLORAL DECORATION IN THE HOME. Vol. 1. Carren, Seymour. 194 pages, illustrated. Orange, Judd Publishing Co., New York. 1962. $6.95.

This simple manual, prepared as a home-study course for the beginner, contains much useful miscellaneous data, such as seasonal suggestions, "language of flowers," state, national, and birthday flowers, and the drying and preserving of cut-plant material.

A PICTURE BOOK OF PRIZE-WINNING FLOWER ARRANGEMENTS . . . AND HOW TO MAKE THEM. Amer, Jean B. 41 pages, illustrated (part colored). (A Margaret Harold Publication) Allied Publications, Nashville, Tenn. 1959. Paper, $1.95.

Each of the prize-winning arrangements pictured is carefully analyzed and discussed.

A TREASURY OF DRIFTWOOD AND DRIED ARRANGEMENTS. Ishimoto, Tatsuo. 124 pages, illustrated. Crown Publishers, New York. 1962. $2.95.

The author's name is familiar to those who have enjoyed his earlier books on Japanese gardens and floral arrangements. The contents of the present volume exemplify the caption on the title-page—"some dried weeds, a piece of weathered wood, a base or bowl and the designer's eye."

WORKBOOK OF CONTAINERS, STANDS AND MECHANICS; with 33 Arrangements and 34 Drawings by the Author. Goldson, Rae L. 32 pages, illustrated, indexed. Hearthside Press, New York. 1962. $2.50.

A separately published supplement which is contained in the author's revised and enlarged edition of *Contemporary Flower Arrangement.*

SOILS AND FERTILIZERS

SOIL SCIENCE SIMPLIFIED; 2nd ed. Kohnke, Helmut. 79 pages, illustrated. Balt Publishers, West Lafayette, Indiana. 1962. Paper, $1.00.

A soil science primer for beginning students in horticulture and agronomy and for amateur gardeners who do not have the time nor inclination to peruse more voluminous and technical works.

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DICTIONARIES AND INDEXES

A DICTIONARY OF AGRICULTURAL AND ALLIED TERMINOLOGY. Winburne, John N., ed. 905 pages, bibliography. Michigan State University Press, East Lansing, Mich. 1962. $15.00.

The language of the gardener, the farmer, the florist, and the pesticide manufacture (to name only a few) has become so involved as to warrant the compilation of a dictionary of terms and names frequently found in farm and gardening literature. Here is a good-sized volume of many thousands of references, which should prove an invaluable source of hard-to-find information.

INDEX TO COMMON NAMES OF HERBACEOUS PLANTS. Carleton, R. Milton, comp. 129 pages. The Shoe String Press, Hamden, Conn. 1962. $10.00.

A photo offset re-issue of the 1959 edition. A useful reference source of vernacular names of native and cultivated flowers. Many of the folk names of plants growing in the regions of the Kentucky Mountains and the Great Smokies have been included.

BOTANY AND MICROBIOLOGY

FLOWERS OF FIELD AND FOREST. Hylander, Clarence J. 231 pages, illustrated, bibliography, indexed. The Macmillan Co., New York. 1962. $4.50.

The ambitious beginner-botanist will find this a wonderfully simple guide for the identification of two hundred species of our common wild flowers. Morphological terms are carefully described and illustrated. Environmental and color clues are basic aids in the keys. The "thumb-nail" work sketches of each plant are clever and entertaining.

INTRODUCTORY PLANT PHYSIOLOGY LABORATORY MANUAL, 2nd ed. Kurtz, Edwin B. Jr., and Alan M. MacEwan. 74 pages, illustrated. Burgess Publishing Co., Minneapolis. 1961. Spiral, $3.00.

Well-planned to help the teacher and the student. Fourteen laboratory assignments with detailed information on the reagents and supplies that are needed for each project and lecture demonstration.

MICROBES IN ACTION: A LABORATORY MANUAL OF MICROBIOLOGY. Seeley, Harry E. and Paul J. Vandemark. 449 pages, illustrated, bibliography. (also, Instructor's Manual, 43 pages) W. H. Freeman and Co., San Francisco. 1962. Paper, $3.90.

Ninety-six laboratory problems based upon current laboratory work in elementary bacteriology at Cornell University. Useful data on

stains, reagents, indicators, and media. *The Instructor's Manual* contains sample quiz questions, laboratory schedules, sources of films and film strips, lists of cultures, and so forth.

A TEXTBOOK OF BACTERIOLOGY, 2nd ed. Pandalai, N. G. 832 pages, illustrated, indexed. Taplinger Publishing Co., New York. 1961. $12.50.

Dr. Pandali, who is Professor of Bacteriology at the Medical College at Kozhikode, India, has greatly revised and enlarged his original work which appeared in 1948. Particular attention has been given to recent advances in the study of antibiotics and virology.

ECONOMIC BOTANY

RUBBER: BOTANY, PRODUCTION, AND UTILIZATION. Polhamus, Loren G. 449 pages, illustrated (colored frontspiece), bibliography, indexed. (World Crop Series) Interscience Publishers, New York. 1962. $14.50.

For a long time there has been a great need for a definitive work of this type. Dr. Polhamus, formerly Head Agriculturist in Charge, Rubber Crops Sections, U.S.D.A., is at present Technical Adviser on Rubber Plants, Agricultural Research Service, U.S.D.A. His presentation of the many facets of rubber-producing plants and their utilization is well organized.

STALKING THE WILD ASPARAGUS. Gibbons, Euell. 303 pages, illustrated, indexed. David McKay Co., New York. 1962. $4.95.

A marvelous compendium devoted to wild plants which may be used for food and drink, and for medicine. Written in a chatty, knowledgeable, and often humorous style. Intriguing recipes and cooking techniques galore.

GENERAL BOTANY AND BIOLOGY

THE STUDY OF FLOWERS MADE SIMPLE. Grimm, William C. 152 pages, illustrated, indexed. (Made Simple Books) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

First botanical steps for the adult who chooses the "self-teaching" method of learning the elementary fundamentals of plant identification. A good glossary of botanical terms, and illustrations and diagrams of about two hundred wild and cultivated plants.

THIS IS A LEAF. Hutchins, Ross E. 121 pages, illustrated, indexed. Dodd, Mead and Co., New York. 1962. $2.79.

Fascinating accounts of the myriad forms and uses of leaves—carnivorous, sensitive, fossil, autumn-colored, aquatic, parallel-veined, net-veined—in short, the morphology, physiology, and economic products of leaves, ably written and pictured.

THIS IS LIFE: ESSAYS IN MODERN BIOLOGY. Johnson, Willis H. and William C. Steere, eds. 354 pages, illustrated, bibliographies, indexed. Holt, Rinehart, and Winston, Inc., New York. Paper, $3.95.

Twelve important aspects of modern biology, written by men and women who are active in their respective fields of research. This notable collection of papers is primarily designed as interesting, collateral reading for advanced high school and freshman college students in beginning botany and zoology courses. Brief biographical notes and a photograph of each author precedes each chapter.

MICROBIOLOGY AND CYTOLOGY

DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, Vol. 3. Society for Industrial Microbiology. (Proceedings of the 18th general meeting of the Society, held at Lafayette, Indiana, August 27-31, 1961). 398 pages, illustrated, bibliographies, indexed. Plenum Press, New York. 1962. $13.50.

The principal main topics of the papers are: Microbiological Applications for Space Vehicles and Extraterrestrial Stations; Preservation of Oil-in-Water Systems; Problems in Water Microbiology; and Fermentations. Also, twelve papers on miscellaneous subjects pertaining to industrial microbiology.

AN INTRODUCTION TO THE CYTOGENETICS OF POLYPLOIDS. Dawson, G. W. P. 96 pages, illustrated, indexed. F. A. Davis Co., Philadelphia. 1962. Paper, $2.00.

The clear teaching ability of a professor at Trinity College, Dublin, is reflected in this concisely written text for college students.

GENETICS

GENETICS. King, Robert C. 347 pages, illustrated, bibliographies, indexed. Oxford University Press, New York. 1962. $7.50.

An up-to-date college text by an associate professor of biological sciences, Northwestern University, with excellent detailed illustrations by E. J. Pfiffner, Staff Artist of the Chicago Natural History Museum. Well-selected bibliography follows each chapter.

GENETICS. Levine, R. P. 180 pages, illustrated, indexed. (Modern Biology Series) Holt, Rinehart and Winston, New York. 1962. Paper, $1.95.

This introductory text for the beginning student of biology contains a brief review of the fundamental facts and principles of genetics and includes present-day findings concerned with the molecular basis of heredity.

GEOLOGY

DICTIONARY OF GEOLOGICAL TERMS. American Geological Institute. 545 pages. (Dolphin Reference Book C 360) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.95.

An abridged and revised edition of the *Glossary of Geology and Related Sciences*, 2nd ed., 1960, published by the American Geological Institute. The present edition contains seventy-five hundred of the more commonly used terms in geology and related sciences. The unabridged edition contains nearly seventeen thousand terms.

ETHNOBOTANY

THE FOREST PEOPLE. Turnbull, Colin M. 305 pages, illustrated, indexed. (Natural History Library, Anchor Book N 27) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.25.

This entertaining account, by an anthropologist, of the life of the pygmies of the Ituri Forest in the northeast corner of the Belgian Congo, has numerous references to the plants used by these people for food, drink, thatch, nets, dyes, and medicine.

THE NAVAHO, rev. ed. Kluckhohn, Clyde and Dorothea Leighton. 355 pages, illustrated, bibliography, indexed. (Natural History Library, Anchor Book N 28) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

In the Foreword, Dr. Stanley A. Freed states that this work "is still the most useful and authoritative general ethnography on the Navaho".

INSECTS

FUNDAMENTALS OF APPLIED ENTOMOLOGY. Pfadt, Robert E., ed. 668 pages, illustrated, bibliographies, indexed. The Macmillan Co., New York. 1962. $9.50.

A comprehensive modern textbook for agricultural and horticultural students, written by ten specialists in the fields of insect morphology, physiology, classification, and control. Excellent appendices of common and scientific names and glossary of terms and chemical materials.

THE STRANGE LIVES OF FAMILIAR INSECTS. Teale, Edwin Way. 208 pages, illustrated, bibliography, indexed. Dodd, Mead and Co., New York. 1962. $4.00.

In the fantastic lives of our common, everyday insects Mr. Teale's observant eye and magic camera catch romance, passion, intrigue, industry, frustration, humor, pathos, and much, much more. It is always a joy to discover a new book by this gifted author-naturalist.

THE EDUCATION OF A GARDENER. Page, Russell. 382 pages, illustrated, indexed. Atheneum Publishers, New York. 1962. $10.00.

A profusely illustrated and handsomely printed book, exceptional for its practicality is Mr. Page's *Education of a Gardener*. It is especially sympathetic to me, for Mr. Page admires and understands French gardening style. He has worked a great deal in that country, particularly along the Riviera, where some charming gardens were created by him. When he was beginning his work, he was at Longleat; he also worked with Geoffrey Jellicoe, one of the founders of the Institute of Landscape Architects, and later they became partners. Next Mr. Page engaged in public and semi-public planning. Then came the war and two years in the Middle East; after that he went to China. When the war was over, he joined the business of Vilmorin, perhaps the greatest of its kind in France, if not in all continental Europe. In time people returned to ornamental gardening, but simplified.

There are chapters which are particularly interesting on "In Search of Style," "Notes on Composition and Design," "Near the House," and particularly practical ones on "Planting Trees," "Planting Shrubs," and "Planting Flowers," "Water in the Garden," and last and to me the best is "My Garden." This is still a dream to Mr. Page, but is striking because he sings of the advantages of the compost heap. He will have two.

All in all, a learned and delightful book by a highly experienced creator of gardeners. And not least, it is well written.

HELEN M. FOY
Mt. Kisco, N. Y.

(Continued on page 33)

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. During November and December, 1962, Dr. William C. Steere, Director, addressed the Garden's staff on "Botanical Work in Greenland" at a monthly seminar, a meeting of the Explorers' Club in New York City, a meeting of the Working Gardeners of Bronxville, New York, a luncheon-meeting of the Rotary Club of Mt. Vernon, New York, a luncheon-meeting of the Teachers' Insurance and Annuity Association; lectured on mosses at the In-Service Course for Teachers; and attended a luncheon of the Cultural Institutions Group in New York City, meetings of the Committee on *The Syle Manual* of the American Institute of Biological Sciences, of the Steering Committee of Biological Sciences Communication Project, and of the A.I.B.S. Executive Committee, all in Washington, D.C., the annual meeting of *Biological Abstracts* in Philadelphia, a meeting called by Newbold Morris, Commissioner of Parks of New York City, to discuss museum participation in the 1964 World's Fair, the annual meeting of the Advisory Council of The New York Botanical Garden, and the meetings of the American Association for the Advancement of Science in Philadelphia, December 26-30, 1962.

Dr. Pierre Dansereau, Assistant Director (Botany) gave a seminar on New Zealand vegetation for the Department of Botany, Rutgers University, in November, 1962. Dr. Dansereau will leave for Puerto Rico the middle of February, 1963, where he will give a series of seminars in tropical plant ecology at the University of Puerto Rico, Río Piedras. He will also engage in field work for several weeks, in preparation of a vegetation map for the United States Army, and will be assisted by Peter Buell, son of Dr. Murray Buell, Plant Ecologist at Rutgers.

Dr. H. W. Rickett, Bibliographer and Senior Curator of the Library, attended a meeting of the Advisory Committee of the Rachel McMasters Miller Hunt Botanical Library in Pittsburgh, November 16-18, 1962.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, attended a Neo-Tropical Botanical Conference in Jamaica, West Indies, December 17-21, 1962. Dr. Maguire is a member of the Executive Committee of the new Association for Tropical Biology.

Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, attended the meetings of the American Association for the Advancement of Science in Philadelphia as a delegate for the Mycological Society of America and the Torrey Botanical Club.

Dr. Edmund H. Fulling, Honorary Curator, also attended these meetings, at which time he was presented with the Mary Soper Pope Medal, "awarded from time to time by the Cranbrook Institute of Science in memory of one who lived in the tradition of the protectors of the arts and sciences."

Working in the Research Laboratory with Dr. Richard M. Klein, Alfred H. Caspary Curator, are Dr. Arthur Gentile, Associate Professor of Plant Physiology, who is on sabbatical leave from the University of Massachusetts, and Dr. Harold H. Clum, who is on terminal leave before his retirement from the Department of Botany of Hunter College.

Dr. Elsa O'Donnell, Visiting Research Associate, participated in the International Colloquim for Electron Microscopy in Philadelphia.

Dr. Herman F. Becker, Research Associate, lectured on paleobotany before Public Schools 92 and 217 in Brooklyn, New York, and on prehistoric plants in the In-Service Course for Teachers at the Garden; visited the paleobotany section of the National Museum, Washington, D.C.; and this spring will teach a graduate course on "Plants Through the Ages" in an evening session of the Teachers' Education Program at Hunter College.

The Garden has received renewal of the grant from the Office of Naval Research for continuation of Dr. David J. Rogers' research in the use of computers in taxonomy. Dr. Rogers is Curator of Economic Botany.

Staff Appointment. Peter T. Atkinson of Harbourton, New Jersey, was appointed Assistant Curator of Education, effective December 1, 1962. Mr. Atkinson, who was graduated with a Bachelor of Arts degree from Swarthmore College, Pennsylvania, in 1959, received a Master of Science degree from Rutgers University, Department of Ornamental Horticulture, in 1962. Mr. Atkinson has completed a tour of duty with the United States Army.

Retirement and Anniversary Gifts. Retirement gifts were presented to several employees of The New York Botanical Garden at the Christmas Party on December 20, 1962: to Luigi Guglielmo, Eileen M. Kene, and Henry Hundeshagen, who retired on January 1, 1963, and to Michael Griffin and Michael Tenore, who will retire on March 1, 1963.

Mr. Hundeshagen, Elizabeth C. Hall, Alfred G. Huber, and Michael Kiely received anniversary gifts for twenty-five years of service; T. H. Everett for thirty years of service, and Percy Diver, John Diver, and Alletta G. Fredericks for thirty-five years of service.

Howard W. Swift is now Assistant Director of the Garden Center of Greater Cleveland. Mr. Swift, who has been Assistant Curator of Education at The New York Botanical Garden for the past eight years, was one of the first student-gardeners to complete the two-year courses of instruction in horticulture and botany in the School for Gardeners at the Garden and was the first exchange-student from the Garden to the Royal Botanic Gardens, Kew, Surrey, England. Until 1942 Mr. Swift was a member of the Garden's horticultural force. Between that year and his return to the Garden in 1952, he was with W. Attlee Burpee Co. at its Philadelphia office and at its establishments in Clinton, Iowa, and Lompoc, California, with Podesta Baldocchi in San Francisco, and with Peter Henderson-Stumpp and Walter Co. in New York City. Mr. Swift served with the United States Army from 1943-45, with assignments in Florida, Australia, the Philippines, and Japan.

Dr. Julian Steyermark of the Instituto Botánico, Caracas, Venezuela, arrived at the Garden the last week of November, 1962, to continue his research on the tropical members of the *Rubiaceae*. Dr. Steyermark will spend several months each year for the next several years at The New York Botanical Garden in pursuit of his research.

Robert B. Clark relinquished the position of Assistant Director of the Bayard Cutting Aboretum, Oakdale, Long Island, to assume the duties of Senior Curator for the Library Hyde Bailey Hortorium of Cornell University, Ithaca, N. Y.

Stechert-Hafner, Inc., of New York, have taken over several regional flower books by Dr. Edith S. Clements. The titles are: *Flowers of Mountain and Plain, Flowers of Coast and Sierra, Flowers of Prairie and Woodland,* and *Rocky Mountain Flowers,* the latter by Mrs. Clements and her husband Dr. Frederic E. Clements; also *Adventure in Ecology* by Mrs. Clements, covering almost all of the professional life of this husband-and-wife team in ecology.

Visitors to the Garden.

Henry Norweb, Holden Arboretum, Cleveland, Ohio.

Henry F. du Pont, Winterthur, Del.

L. A. S. Johnson, National Herbarium of New South Wales, Royal Botanical Gardens, Sydney, Australia.

Prof. H. Merxmüller, Botanische Staatssamlung, München, Germany.

Below. Workmen erect guide signs which visitors, right, find useful as they walk around the grounds of The New York Botanical Garden.

Kornelius Lems, Goucher College, Baltimore, Md.

Dr. Josiah L. Lowe, College of Forestry, Syracuse, N.Y.

Dr. R. H. Segall, U. S. Department of Agriculture, Orlando, Fla.

Dr. Miroslav Tomoszewski, Research Center for Dendrology, Posnan, Poland.

Dr. James B. Sinclair, Department of Plant Pathology, Louisiana State University.

Dr. Herbert B. Posner, Dr. Gideon Schaeffer, and Dr. Carrole Kuchert, Brookhaven National Laboratories, Upton, L.I.

Donald Reinhardt, Botany Department, Columbia University, New York, N.Y.

Dr. S. E. McCallan, and Dr. and Mrs. Robert J. Schramm, Jr, Boyce Thompson Institute for Plant Research, Yonkers, N.Y.

Dr. Stephen Hatchett, National Institutes of Heatlh, Washington, D.C.

Dr. George Walldal, University of Oslo, Sweden.

Dr. George Church, Brown University, Providence, R.I.

Dr. Thomas Furman, Washington State University, Pullman, Wash.

Dr. José Lacerda de Araujo Feira and Dr. Fernando de S. Pirés, Nacional Museu, Rio de Janeiro, Argentina.

Dr. Sophia Jakowska, New York Aquarium, New York, N.Y.

Dorothy Hammond and Dr. Theodora Nelson, Hunter College, New York, N.Y.

Dr. Julio Sirlin, University of Edinburgh, Scotland.

Prof. Philip Eton, University of Chicago, Chicago, Ill.

Richard H. Clum, Chicago, Ill.

Dr. Celestus Bonfant, Facultadde Agronomia, Caracas, Venezuela.

Norman Taylor, Princess Anne, Md.

Dr. Edgar T. Wherry, Philadelphia, Pa.

Dr. Leonard G. Brass, Lake Placid, Fla.

Dr. J. Miles Conrad, *Biological Abstracts*, Philadelphia, Pa.

Dr. Borje Lovkvist, Department of Experimental Systematics, Institute of Plant Taxonomy, Lund, Sweden.

Eugene C. Ogden and Janet M. Vounevik, Botany Office, New York State Museum, Albany.

George E. Lindsay, San Diego Museum of Natural History, San Diego, Cal.

Raymond J. Moore, Plant Research Institute, Department of Agriculture, Ottawa, Canada.

Dr. George S. Bunting, Liberly Hyde Bailey Hortorium, Ithaca, N.Y.

Gabriel Edwin, Herbarium, U. S. National Herbarium, Washington, D.C.

(Continued on page 34)

BOOK REVIEWS (Continued from page 31)

ORANGE RECIPES: CUSTOMS, FACTS AND FANCIES. Gordon, Jean. Red Rose Publications, Woodstock, Vt. 102 pages, illustrated, indexed. Paper $1.50, cloth $3.50.

The perfect gift for any season, this charming small book is dedicated appropriately and, I suspect, gratefully to Florida. Miss Gordon's colorful and fragrant book, based on the orange, is a boon to the winter-bound northern housewife whose creative urge may be appeased by testing varied and exciting recipes.

But it is not only for the popular hostess whose invitations are accepted with that pleasurable anticipation of her Epicurean little dinners, nor only for the gourmet who loves to savor the unusual food or drink. Actually it is for the intelligentsia who may quite probably include the foregoing, as well as the historian, the student of folk-lore, the botanist, the horticulturist, and the garden club member, for they all will find the orange-filled slim volume a treasure.

The botanical history of the "golden apple," as it was referred to in Greek mythology as early as the twelfth century, and the tales of its introduction into various countries make absorbing reading. Kubla Khan, no less, introduced the orange into China from India—and, much later, the growing of the golden fruit on a tremendous scale in Florida can be credited to the Spanish Conquistadores and Ponce de Leon.

The types of oranges and their special botanical characteristics are enumerated. The marketing practices by different countries of special citrus products—seeds, peel, pulp, oil of neroli, petitgrain, marmalades (in this connection orange marmalade is assumed, the original marmalade was made from quinces, marmelo in the Portugese) are indicated by a detailed and valuable list. Each chapter is also packed with recipes of which the principal ingredient is, at least, one part of the fruit. To glance at the titles of these recipes is alluring to the gourmet and the cook—from a "Ramos Fizz" through an orange pea-soup, and orange-glazed lamb chops to Grand Marnier following an "Orange Cloud" pie! It is all delicious bed-time reading which, after all is said, should sometimes be one's favorite cook-book in planning for the next day's party.

The list of sources, all over the world, of orange products is worth the price of the book for those who know the value of the vitamin-rich zest of this "king of fruits."

ELIZABETH REMSEN VAN BRUNT
Kitchawan, Westchester Co., N. Y.

THE COMPLETE BOOK OF NATURE PHOTOGRAPHY. Kinne, Russ. 191 pages, illustrated, A. S. Barnes & Co., Inc., New York. 1962. $7.50.

Often it takes more than nature itself to get a good nature-photograph, and Mr. Kinne shows aptly that good equipment and certainly his own ingenuity are a great help in tricking birds and even flowers to be "photogenic." Of course, since he is an expert naturalist, sportsman, and photographer, his book is a valuable source of information. The beginner will become fascinated with nature photography, and the advanced "nature shooter" will get helpful hints in techniques for photographing subjects which would not come voluntarily to a studio for a "sitting." His electronic flash "traps" should be helpful to anyone who wants to photograph birds, mammals, and similar shy or evasive subjects. Mr. Kinne, a frequent visitor to The New York Botanical Garden, fulfills the challenge he set himself in the title of his book: *A Complete Book of Nature Photography;* it is as complete as can be expected.

Better reproduction and more effective and efficient presentation of the photographs would do more justice to his efforts.

WALTER SINGER

Yuji Yoshimura, well-known teacher of the Japanese art of bonsai, shows one of the students, Mrs. Allstair Cooke, in his class at The New York Botanical Garden how to trim her miniature tree.

REVIEWS OF BOTANICAL BOOKS

THE WILD SPECIES OF GOSSYPIUM AND THEIR EVOLUTIONARY HISTORY. Saunders, J. H. viii + 62 pages. Oxford University Press, Fairlawn, N. J. 1961. $2.40.

This publication is intended as a supplement to *The Evolution of Gossypium* by Hutchinson, Silow, and Stephens, published in 1947. It is largely a set of line drawings of wild cotton species, taken from living material cultivated at Shambat in the Sudan. Nineteen species are illustrated. Each drawing is accompanied by a descriptive analysis. A second part of the book describes the world distribution and evolutionary history of the genus *Gossypium*.

DAVID J. ROGERS

OATS AND OAT IMPROVEMENT. Coffman, Franklin A. (ed.) Vol. 8 of Agronomy. xii + 650 pages, illustrated, indexed. American Society for Agronomy, Madison, Wisc. 1961. $11.00.

Fifteen authors contribute to this book, one of a series of monographs published by the American Society of Agronomy. In the fifteen chapters, the botanical, agricultural, and marketing problems of oats are discussed. There are numerous tables and illustrations, all of good quality and attractively presented. All of the literature citations are grouped in one alphabetical list at the end of the book; this is an excellent idea, both in saving on printing and in general usefulness. Certainly a valuable contribution to layman and specialist alike.

DAVID J. ROGERS

A MONOGRAPH OF THE WORLD SPECIES OF HYPOXYLON. Miller, Julian H. 158 pages, illustrated, indexed. University of Georgia Press, Athens. 1961. $6.50.

Species of *Hypoxylon* are among the commonest fungi to be found on dead trees, stumps, logs, and wood. A few species parasitize living trees, causing canker diseases. Most species are black and carbon-like in texture. Dr. Miller devoted over thirty years to a study of *Hypoxylon* and its relatives. This monograph, written just before his death, is an excellent example of the type of taxonomic treatment needed for most genera of fungi. Of the five hundred or more species described in the genus, Dr. Miller recognized one hundred and twenty as good. In addition to the keys, descriptive synonomy, etc.,

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CLARK T. ROGERSON

ALGAE OF THE WESTERN GREAT LAKES AREA. Prescott, G. W. Rev. Ed. 977 pages, illustrated, indexed. Wm. C. Brown Co. Inc., Dubuque, Iowa. 1962. $12.50.

In this revised edition Dr. Prescott describes and illustrates some eleven hundred species of freshwater algae known to occur in Wisconsin and Michigan. A welcome addition is an appendix giving an illustrated key to the genera of desmids and diatoms which was not included in the first edition (1951). Introductory material covers the algae in general (eight divisions recognized), geological features and algal distribution, relationship of phytoplankton to lake productivity, and drawings illustrating morphological terms. The bulk of the book is a systematic account with keys and descriptions to orders, families, genera, and species. Plates of excellent drawings for the species follow a glossary and a bibliography of forty-nine tightly packed pages.

Without question this is the best available manual for the identification of North American freshwater algae in existence.

CLARK T. ROGERSON

ROLE OF BLUE-GREEN ALGAE IN NITROGEN ECONOMY OF INDIAN AGRICULTURE. Singh, R. N. Indian Council of Agricultural Research, New Delhi. 1961. 175 pages, illustrated, indexed. $7.00.

Most biology texts expound the important role of bacterial fixation, but few mention that certain blue-green algae also are capable of fixing nitrogen. Agriculturists have exploited the nitrogen-fixing bacteria; Dr. Singh believes that the blue-green algae can and should be exploited in the same way.

Anyone interested in biology or agriculture will find the monograph worth studying. This excellently written treatise outlines the potential importance of the blue-green algae in fixing atmospheric nitrogen, particularly in rice culture. The monograph undoubtedly will stimulate widespread theoretical and applied work in tropical countries where rice is the major food crop.

In addition to introductory material on microbiological processes and microorganisms, Dr. Singh reviews the characteristics of blue-green algae, discusses their ecology, and then presents several chapters on nitrogen-fixation by soil algae, their potential use in rice fields, reclamation of alkali soils, conservation of other soils, biological productivity, and their role in a natural economy.

A reference list of three hundred and sixty-five entries without question is the most complete bibliography on the subject. An addendum presents recent research.

CLARK T. ROGERSON

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NEWS, NOTES (Continued from page 33)

Plant Classification Aided by Serology. Dr. Marion A. Johnson, Professor of Botany and Dean of Rutgers University's Graduate School, and Dr. David E. Fairbrothers, also of Rutgers' Department of Botany, have developed unique serological methods to measure family relationships among plants.

Although serology has been used in animal classification for many years, it was not applied to plants in this country until 1949 when Dr. Johnson began preliminary work. Dr. Johnson and Dr. Fairbrothers have been working together for the past five years under grants from the National Science Foundation.

The first step in their process is to extract a protein, or antigen, from the plant seed. Injected into a laboratory animal, such as a rabbit, this causes the animal to produce antibodies in its bloodstream.

The mixture of blood and antibodies, known as an antiserum, becomes the standard for chemical comparison between the first plant and all other plants under consideration. The antiserum is removed from the animal and combined with antigens from each of the other plants. The resulting precipitates are analyzed serologically to determine the degree of relationship between each of the other plants and the first.

This method provides a quantitative picture of plant relationships, but more qualitative results are obtained through a technique which makes use of agar, a gelatin-like substance produced by algae, much used in the culture of lower organisms. Antigens from various plants are combined with one antiserum in a dish containing agar. The way in which each antigen combines with the antiserum indicates the nature of similarities and differences among the plants.

Dr. Johnson and Dr. Fairbrothers have conducted experiments on representatives of fourteen plant families, including various grasses, the potato, buttercup, cucumber, and dogwood. They have found that magnolias in the northeastern United States are more closely related to those found in Asia than to other American species. In most cases, there is a correlation between structural appearance and chemical make-up, but their chemical work has revealed some significant exceptions.

The United States National Arboretum is the recipient of a gift of fifteen hundred rare dwarf evergreens from William T. Gotelli of South Orange, New Jersey. This collection includes specimens from the major kinds of evergreen trees, most of the specimens coming from Europe, some from Canada, Japan, Australia, and New Zealand, Dwarf trees occur only rarely and unpredictably in nature. Some of the trees in the Gotelli collection are only a few inches tall, others are as high as six feet. One of Mr. Gotelli's favorite evergreens is the twenty- to twenty-five-year-old *Cedrus deodara pygmaea,* only sixteen inches high and with a spread of twenty-four inches. Most of them will be planted on a four-acre hillside under the supervision of John Jennings, a landscape architect of Summit, New Jersey, who assisted Mr. Gotelli in assembling the collection. The very small specimens, grown in containers, will be accommodated in the Arboretum's attractive new glasshouses.

The present gift contains about five hundred other plants, including azaleas and rhododen-

drons; a horticultural library of three thousand volumes; and stonework, statuary, and irrigation equipment from Mr. Gotelli's garden. Earlier, in 1961, Mr. Gotelli gave the National Arboretum more than two hundred rare rhododendrons and tree peonies.

The Garden Writers of America were privileged to see part of the Gotelli collection of evergreens when Dr. Henry T. Skinner, Director, guided them on a tour of the National Arboretum during their annual meeting and seminar held at University Park, Maryland, in late October, 1962. Dr. Skinner also called their attention to some of the hollies—the Arboreteum has over seven hundred named species and varieties—and also pointed out a heavily fruited flowering crab-apple 'Gorgeous', a Glenn Dale introduction from New Zealand. In answer to "Is that a eucalyptus? A eucalyptus growing outdoors here?" Dr. Skinner informed the group that three species of *Eucalyptus* from high elevations in Tasmania are doing well on the grounds of the National Arboretum.

The Garden Writers of America visited the research greenhouses of the University of Maryland, where Dr. Conrad Link and two of his graduate students explained some of their projects, and the United States Department of Agriculture Research Station at Beltsville, Maryland. There Dr. Sam Emsweller, Dr. Curtis L. May, Dr. Henry H. Cathey, Dr. Neil W. Stuart, Dr. Robert N. Stewart, Dr. Toro Arisumi, and others gave explanations and demonstrations of their particular researches: stimulating, retarding, and dwarfing plant growth with chemicals; advancing and retarding bud formation and flowering with intermittent or cyclic, artificial lighting; controllng algae on flower pots by a commonly used commercial disinfectant; breeding roses and saintpaulias. In his rose-breeding program, Dr. Stewart is using species, not varieties or hybrids, to develop new roses with inbred immunity to disease. In telling of the problems in inbred immunity, Dr. Stewart said that black spot had been collected from twenty-three different localities, and that twenty-three separate races of black spot had been isolated. Different localities have different races of black spot. This explains why black spot does not yield all the time to one fungicide, for the one fungicide may not be effective against all the races.

Dr. May told his audience that appreciable control of the spread of the Dutch elm disease has been attained by the elimination of diseased trees in given areas and by an annual dormant spray of DDT. This annual application builds up a residue of DDT in the crotches of the branches sufficient to ward off attacks by the two beetles that carry the disease. Dr. May is presently engaged in research on the wilt disease that is attacking *Albizzia julibrissin* in the South and on the disease, still unidentified, that is attacking the sweet gum, *Liquidamber styraciflua.*

The Garden Writers of America were also addressed by Dr. John C. Krantz, Jr., Professor and Head of the Department of Pharmacology of the School of Medicine, University of Maryland, on "Medicine—Its Debt to the Vegetable Kingdom." Dr. Krantz's talk was published in the September-October, 1961, issue of *The Garden Journal.*

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Strawberry 'Geneva' was developed by Dr. George L. Slate of the New York State Experiment Station at Geneva, by crossing N.Y. 316 ('Streamliner' × 'Fairfax') with 'Red Rich' ('Wayzata' × 'Fairfax'). The berries start to ripen in mid-June and furnish an abundant crop for two or three weeks; during the following two weeks, some berries are borne, but the next full crop is produced the end of July and continues until October or a heavy frost. The berries have slightly darker than medium red flesh, are juicy and flavorful.

Fully grown plants of 'Geneva' are large, so they should be spaced eighteen inches apart to provide adequate air circulation. While they can be grown in the matted row method, they produce more freely when grown in hills, with all runner plants removed and each plant heavily mulched with sawdust. A well-balanced liquid plant food will compensate for any loss of nitrogen from the soil by the sawdust.

It was introduced last year by the New York Fruit Growers Cooperative Association under the number N.Y. 547. It was named 'Geneva' by the New York State Experiment Station after extensive testing. If this fine strawberry performs elsewhere as it has at Geneva, it may replace other everbearing varieties. Stern's Nurseries of Geneva is offering plants. They may also be obtained from the New York State Fruit Growers Cooperative Association in Geneva.

Hemerocallis 'Dr. Stout's Double Gold' will be introduced this spring by Wayside Gardens, Mentor, Ohio. Some years ago the late Dr. A. B. Stout, then Curator Emeritus of The New York Botanical Garden, gave Wayside Gardens a quantity of seeds of what he termed "hybrid double hemerocallis." Several hundred plants were raised, and all but one were destroyed. This plant is a robust grower and prolific bloomer, its straight, stiff stalks topped by eight to twelve flowers and buds. Its clear golden-yellow flowers, instead of being fully double, have two rows of twelve petals which are of good texture, broad, and reflexed or curved sharply backward. Flowering begins the last week in June and continues until August.

A "conversation piece" for gardens is *Crocosmia masorum,* an Africam member of the *Iridaceae* which is seldom seen. The flower stalk grows upright to two to two and a half feet, then bends horizontally and somewhat downward. The horizontal portion of the stalk is created with a double row of flowers resembling montbretia *(Tritonia)* and are a brilliant burnt-orange. The leaves are similar to the leaves of gladiolus. The corms should be planted in full sun and given plenty of water; they multiply rapidly. *C. masorum* is hardy south of Washington, D.C. It is treated the same as gladiolus in the Northeast.

Wayside Gardens are also introducing cultivated forms of goldenrod or *Solidago.* The English favorite 'Golden Rosa' was so named because its sprays of lemon-yellow flowers resemble those of the well-known mimosa or *Acacia.* The other form, 'Peter Pan', has a rigid two-foot stem, about thirty inches tall, which needs no staking. The deep, lemon-yellow flowers are borne on horizontal stalks at the top of the stem. 'Peter Pan' starts flowering in July, whereas 'Golden Rosa' flowers in August and September.

Prof. Glenn Viehmeyer of the North Platte Experiment Station, Nebraska, has spent a number of years in collecting, selecting, and breed-

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ing penstemons. He has developed a disease-resistant, hardy strain, and Geo. W. Park Seed Co. of Greenwood, South Carolina, is introducing several of his originations this year. 'Prairie Dusk' forms a low clump of glossy, deep green leaves above which rise twenty-two-inch stems clothed for half their length with beautiful flowers in blue, purple, or pink, each floret being an inch long and three-quarters of an inch wide. The F_2 hybrid 'Prairie Fire' grows about three feet high and has rose-red, sky-blue, or purple flowers. The *P. cobaea triflorus* Henry Hybrids have the largest flowers of the hardy strains of penstemons, in colors tending to rose but also pink, blue, and purple.

One of Park's own originations is impatiens 'Tangerine', a good plant for a shady summer border and also a delightful pot plant since it will bloom continuously indoors. The plant is well named, for the flowers are a golden tangerine, an effective color contrast against the glossy leaves.

Scientific Advances in Plant Cultivation during the past fifteen years have resulted in more precise control of plant growth through chemicals to stimulate, retard, or dwarf growth, through automatic temperature, humidity, and watering devices, and through cyclic lighting. A recent advance in the science of controlled lighting is bringing fresh vegetables to men beneath the Arctic Circle. Known as cyclic programmed lighting and developed by the Industrial Timer Corporation, it gives intermittent light to plants and allows them to grow under unusual conditions.

On a recent cruise of the Polaris submarine "Robert E. Lee," kits for growing vegetables were provided the crew. The kits held lettuce, carrots, and peas in boxes containing the necessary nutrient chemicals for plant growth, and intense fluorescent lights, controlled by a cyclic lighting programmer, were also furnished. Lettuce grew in about three weeks, carrots and peas in about four weeks. Additional kits will be installed in the other United States atomic submarines.

Peggie Schulz, Garden Club Editor of *Flower and Garden Magazine*, author and lecturer, will conduct a garden tour this May through France, Holland, Germany, Switzerland, Italy, and England. Three days will be spent at the 1963 International Horticultural Exposition at Hamburg. Mrs. Schulz is well known, since she has held office in the American Horticultural Council, the American Horticultural Society, the Garden Writers Association of America, and other organizations. Information about the tour may be obtained from her at 7714 Fairfield Road North, Minneapolis 12.

The Preservation of Valhalla Glen, a hemlock ravine of twenty-five or so acres near Boonton, New Jersey, is being considered as a Nature Conservancy project. This natural stand of hemlocks, and its association of lichens, mosses, fungi, and ferns, is one of the few remaining undisturbed natural spots in the State of New Jersey. No State funds are available to purchase this land; interested individuals, garden clubs, and other groups are requested to communicate with Dr. A. E. DeAlton Partridge, President of Montclair State College, Upper Montclair, New Jersey.

SEMPERVIVUMS (Continued from page 23)

there are large, sloping rock faces devoid of any soil, and to establish groups of plants on these difficult areas sempervivums were employed. Sheet moss, in large slabs, was placed on the bare rock with the moss side down, and the lower edges (downhill side) were rolled under like a dam, to hold the thin layer of soil that was spread over the moss. The lower edge was then planted with sempervivums which quickly took hold, thus giving the strong plants a stable home into which to root. This method could be used to great advantage in Westchester and Putnam Counties, New York, where many homes have huge granite outcrops. In smaller gardens, a collection of colorful rosettes can be assembled around the patio, or a small rock garden just for sempervivums can be constructed, duplicating their natural abode in the mountains.

The collector of sempervivums prefers to grow many of them in shallow pans in a cool greenhouse or frame, where food and moisture can be rigidly controlled. This is a satisfactory method, if space is available, as the plants can be brought into the house for study and then returned to the greenhouse or frame. They become beautiful specimens when properly cared for. A piece of weathered stone added to the shallow pan creates a miniature rock garden certain to please everyone.

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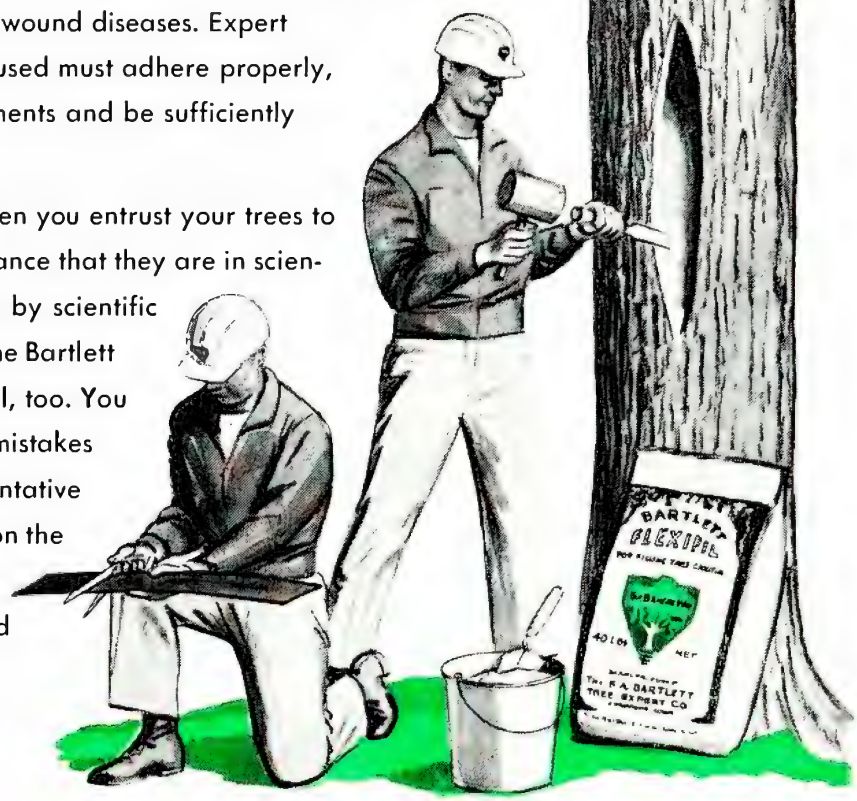

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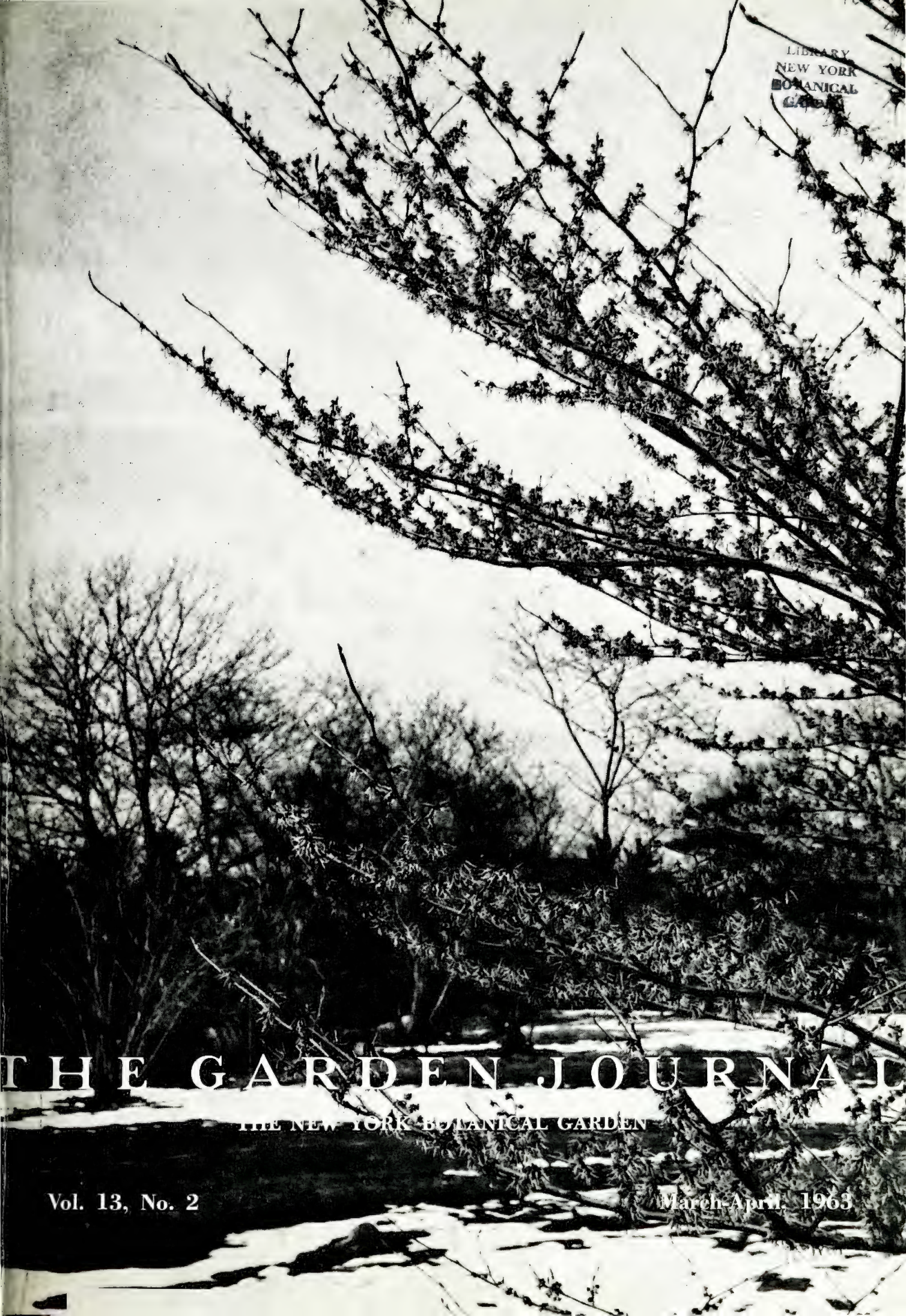

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Editor

CALENDAR

Until April 1, 1963. Memorial Exhibition of the photographs of the late William H. Schleisner in the Museum and Administration Building of The New York Botanical Garden.

April 4, 1963. Members' Evening of The New York Botanical Garden, Essex House, New York, N. Y.

Apr1 5-26, 1963. Easter Show in the Conservatory of The New York Botanical Garden.

April 17, 1963, 10 a.m. - 3 p.m. Special One-Day Course, "Flowering and Berried Trees and Shrubs," at The New York Botanical Garden.

April 20 - 27, 1963. Historic Week in Virginia, sponsored by the Garden Club of Virginia. For information: Room 3 Mezzanine, Hotel Jefferson, Richmond 19, Va.

April 26 - October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

May 6, 1963. Annual Meeting of The New York Botanical Garden.

May 7 and May 14, 1963. Annual Showing of gardens and penthouse terraces, sponsored by City Gardens Club of New York City.

May 16, 1963. Spring Garden Tour to North Shore, Long Island, sponsored by the Volunteer Associates of The New York Botanical Garden.

May 16, 1963. House and Garden Tour in Westchester County, N. Y. and Greenwich, Conn., for the benefit of the Institute of Physical Medicine and Rehabilitation, New York University Medical Center.

May 26, 1963, 2 - 5 p.m. Garden State Iris Society Show, Fairleigh Dickinson University, Madison, N. J.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

June 19, 1963. Reception for graduates of The Two-Year Courses in Botany and Gardening at The New York Botanical Garden.

October 3 - 12, 1963. Fourth World Orchid Conference, Singapore.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

November 9 - 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration—spring and winter meet at The New York Botanical Garden, photographed by Walter Singer; contents page, pp. 55 upper, 56 upper, 57-62, 73, Walter Singer; pp. 38-42, Yoshiaki Ogawa; pp. 43-45 Arnold Arboretum; p. 47, Nancy Grasby; pp. 49-53, Arthur W. Ambler; pp. 54, 56 lower, Wee-Carr Studio; p. 56 lower, U.S. National Arboretum; p. 66, Charles C. Clare, Jr.; p. 75, William H. Schleisner—courtesy Gottscho-Schleisner, Inc.

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CHRYSANTHEMUMS IN JAPAN

By CORNELIUS ACKERSON

Mr. Ackerson is the Editor of *National Chrysanthemum Society Bulletin,* official publication of the National Chrysanthemum Society, Inc., U.S.A., and author of *The Complete Book of Chrysanthemums.*

JAPAN IS KNOWN as the land of the cherry blossoms and the Geisha girls, but it has not received deserved recognition for the horticultural skill of its industrious gardeners. This lack of recognition is quite evident, in the culture of chrysanthemums, for throughout Japan many a chrysanthemum display, so far as foreign visitors are concerned, "is born to blush unseen, and waste its sweetness on the desert air."

Visitors to Japan have long toured the country when the cherry blossoms are at their best, but there are often many rainy days in the spring of the year. In autumn, however, the weather is invariably clear and balmy, and the fall coloration, combined with magnificent chrysanthemums artistically displayed, make this an ideal time to visit Japan.

With this thought in mind, Lindblad Travel Inc., of New York City decided to add a "Chrysanthemum Festival Tour" of Japan to its list of garden tours conducted in cooperation with leading garden magazines. I was asked to conduct the first of these proposed yearly pilgrimages.

In America hardy garden chrysanthemums are displayed in large plantings at The New York Botanical Garden and at other public and private gardens. Chrysanthemum shows are sponsored by chapters of the National Chrysanthemum Society Inc., U.S.A., in many parts of the country, at which varied exhibition types are to be seen. However, in none of the chrysanthemum displays in America do we find the degree of cultural skill that is evident in the land where the chrysanthemum is truly "Queen of Autumn."

When the tour was first planned, I communicated with Yoshiaki Ogawa of Kurme City, Japan, a leading authority on the cultivation of chrysanthemums and well acquainted with many members of the principal chrysanthemum societies in that country. He made extensive arrangements for our welcome at the outstanding displays on the main island of Honshu and all of these were included, with the historical and scenic points of interest, in a delightful twelve-day tour.

Tokyo was our point of entry into Japan. There we visited the Imperial Garden at Shinjuku Gyoen, and Hibiya Park. At the former place we were conducted through the extensive gardens by Mr. Miyamura, who is in charge of the chrysanthemum displays. This was a typical "stroll" garden which, by Japanese interpretation, must be artistic from every angle. And indeed it was, for amid rolling hills, placid ponds, and beautiful trees various types of chrysanthemums were artistically displayed in special structures called *Kadans.* These resemble our lean-to buildings and have sides and back of bamboo and an oiled-paper roof with geometric designs painted in black. The front is framed in a heavy, dark, solid-colored drape which gives a picture-like effect to the beauty within. All of the more than fifteen distinct forms of chrysanthemum blooms were shown in their respective *Kadans,* but those rarely seen in America naturally caused the most comment. Of these, the *Ichimonji,* or broad-petaled singles, were most interesting. They were the size of dinner plates and were supported on circular wire frames called *rindai*—one bloom to a plant grown in a large pottery container. The plants were staged in rows by color so that there was a horizontal kaleidoscope, with each bloom identical in height with its neighbor.

Kadan display of disbudded chrysanthemums, grown one bloom to a plant, at Shinjuku Gyoen in Tokyo, Japan.

A vivid pink Ichimonji-type chrysanthemum, grown by Hideo Uda.

At Hibiya Park, the amateur entries, which had been judged just before we arrived, were also arranged in *Kadans.* Since they were grown by many gardeners, they represented greater diversity in culture than we had seen at the Imperial Garden. Many of the entries had been trained in the *San bon dachi* style that requires three blooms on a single container-grown plant. To accomplish this the grower must pinch out the terminal growth of the main stem of a plant and carefully develop the resulting three breaks outward and upward to terminate in three blooms equal in shape, size, color, and height on their respective stems.

The most outstanding exhibit at Hibiya Park was the collection of bonsai chrysanthemum plants grown by Mr. Nakajima. He is the foremost exponent of culture in Japan, and he displayed many examples of his art. Technically the term bonsai means dwarf, but the true art lies in the development of the vegetative growth and the resultant miniature blooms into a planned artistic shape proportionately related to the small container.

To describe the one-, three-, and even five-year-old plants and the great amount of hybridizing which has been done by Mr. Nakajima in developing the special strain of seeds he uses is beyond the scope of this article. I shall mention only the one type of culture that provoked the most interest. This was a living plant combined with driftwood or rock in such a way that the plant seemed to be growing as a crowning part of its inanimate base. To accomplish this a seedling plant is transplanted in very early spring into the top of a hollow tube composed of two bamboo halves tied together. The tube is several feet long and filled with a mixture of coarse sand, loam, and organic compost. The roots grow down into this mixture and reach the base in June, at which time the two halves are separated and the soil is carefully removed from the roots. The strongest roots are retained and all others are removed. The plant is so set on its base of rock or driftwood that its ultimate shape at blooming time will blend proportionately with that of its host. The roots are carefully and artistically draped down to a container filled with soil. This is usually a low, oblong, ceramic dish which is also in pleasing proportion with the components it contains. The exposed roots require a covering of moist gauze or similar material until they can endure full outdoor exposure. Of course, all other aspects of chrysanthemum culture must be considered to an even greater extent than would be required in developing a specimen plant for landscape use.

As we toured Japan by train and bus, we were keenly aware of the value that its people attach to all floral beauty and to the chrysanthemum in particular. Despite the urgent need to devote every available foot of land to food production, there is still room for a few chrysanthemums. We saw them in rice fields, in backyards, and even outside small shops. In patios or other areas too small for any other use, both in cities and in suburbs, there were many little displays of chrysanthemums. These plants were grown in rather large attractive ceramic pots of the type that we glaze and sell as jardinieres, and at prices that preclude their liberal use.

For those who have no space to spare on pot culture, there are the cut-flower markets. Several times in the larger cities I watched women from many walks of life hurrying home with a small package of three chrysanthemums and some living or dried plant material. From these they construct exquisite arrangements, perhaps an *Ikebana* floral composition which focuses attention on the theme of heaven, man, and earth. Flower arrangements are an important part of Japanese home decoration, and they are placed in a *toko-*

The chrysanthemum, in the San bon dachi style of culture, won a Ministry of Agriculture and Forestry prize for Matsatsuga Yajima at the Hibiya Park exhibit.

Bonsai chrysanthemum, grown in the Kitsuke style, by Jutare Kojima.

noma, or alcove section, of the Japanese family room.

An impressive invitation came from Zenichi Hasegawa, Managing Director of Nagoya Castle. His fine example of brush calligraphy was in the form of the imperial invitations of feudal days, inviting us to view the chrysanthemum display and to participate in a tea ceremony at the Imperial Residence located on the castle grounds.

Nagoya Castle is an imposing fortress on a high wall overlooking Japan's third largest city. It was built by Shogun Hideyoshi Toyotomi in 1612. The spacious grounds of the castle made an ideal setting for *Kadan* displays of many types and cultures of chrysanthemums. As it was throughout Japan, here, too, the most impressive part of the chrysanthemum exhibits was the evidence of expert culture and superb display techniques. It is necessary to grow a considerable number of plants in a particular form, to have them in bloom and ready for display at the proper time. Fortunately, the chrysanthemum has a blooming date that is largely dependent upon short days, which occur at almost the same time every year; further, the blooms will last as long as three weeks upon the plant. Even so, it still takes a considerable number of plants (and with no diseased leaves) to fill a small *Kadan.* And the location of the containers so that each bloom blends with the others in a pleasing geometric pattern presents a problem of measurement and placement which requires patience as well as skill.

Although our tour was designed to emphasize the major chrysanthemum displays on the island of Honshu, it also gave us an opportunity to learn a little about the life, culture, and industry of Japan. The forests and mountains occupy slightly over sixty per cent of the total land mass; a little less than twenty per cent is devoted to farms, orchards, and pastures. Intensive farming is practiced in order to produce enough food to feed the more than ninety-three million people living on twenty per cent of an area which is smaller than several of our States.

The farms are generally small, so that it has not been practical to use mechanical farming equipment. Nevertheless, rice production averages fifty-seven bushels to the acre in Japan, the highest rate of production in the world. The answer is manpower, or perhaps we should say womanpower, plus available manpower. We traveled through miles of rice fields after the harvest was finished. Everywhere we could see many women and a few men working in the fields, for it was the season to stack the rice straw to be used in

A Japanese historical scene with chrysanthemum figures in the Doll Show at Hirakata Park.

making *tatami,* the mats that are the only floor covering in Japan, and to provide fibre for industrial and commercial uses. Rice farming, with its seed beds, flooded paddys, transplanting, painstaking weeding and cultivating, and winter-wheat crop rotation requires year-round attention which can only be supplied by many tireless hands. As a diversion from the monotony of the rice fields, and to increase the yearly income and diet, the farmer and his family engage in silkworm culture and vegetable growing.

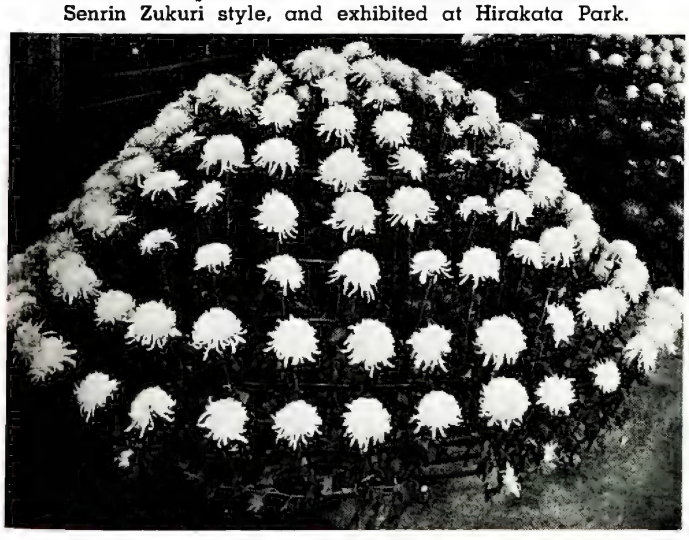
In the great industrial cities of Osaka and Nagoya, huge modern industrial plants and small family enterprises are located side by side in a striking contrast between the old and new. As an engineer I could appreciate the careful design of the equipment for handling materials, the electrical power supply, and the labor-saving machinery in the new factories encroaching upon the level farm lands. I also marveled at the painstaking hand labor employed in such ancient industries as the making of roof tile.

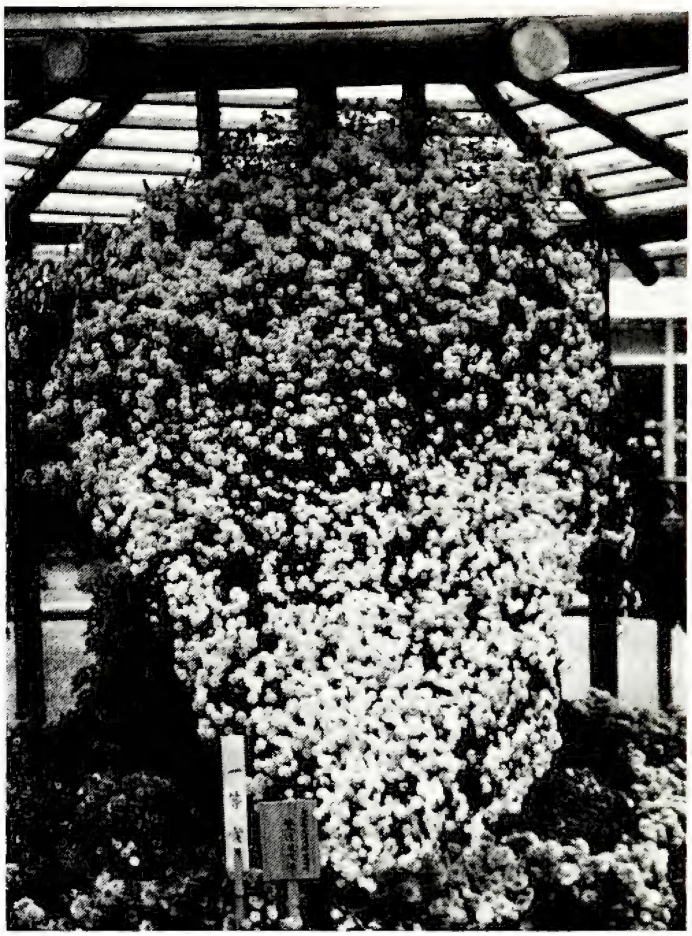
The great port cities of Yokohama and Kobe bring together the old and the new in a tide of commerce; this is the key to Japan's ability to blend ancient culture and modern industrial methods. Here, ships of all nations unload raw materials in exchange for rice, silk goods, roof tiles, and transistor radios.

The Chrysanthemum Festival Tour led us towards Kyoto, the cultural center of old Japan. On the way we visited Hirakata Park which has the largest and most versatile chrysanthemum show in Japan, its feature being the Chrysanthemum Doll Show which has been held annually for fifty years. In a building as large as an airplane hanger, many life-sized figures clothed in chrysanthemums were arranged in tableaux depicting historical events of feudal days. Some of the dolls were formed by training a living plant on a wire frame in such a way that the blooms outline the figure in beautiful floral garments. Other figures were made by inserting chrysanthemum blooms into damp sphagnum moss enclosed within a wire frame. The lighting and general arrangement of the different scenes made the show a joy to behold and a photographer's paradise.

On either side of the entrance to the Doll Show there were bamboo screens on which were mounted the largest cascade chrysanthemums of the many we saw on the tour. A cascade is started from a single chrysanthemum cutting,

One of the specimens, trained in the umbrella-like, or Senrin Zukuri style, and exhibited at Hirakata Park.





A grand cascade, grown and exhibited by Mr. and Mrs. Tomi Nobe at Hirakata Park.

approximately six inches tall. The central stem is tied to a strong wire stake which is gradually bent to a position lower than horizontal during the long growing season (it takes a year to develop a cascade). Meanwhile the side shoots from the main stem are pinched to produce branching, and the whole mass of branches is trained along a wire frame attached to the central stake. During the growth cycle the plant must be shifted many times into increasingly larger pots and finally into a large wooden tub. The plants at Hirakata Park were a mass of single chrysanthemum blooms cascading like a waterfall for twelve feet and extending outward three to four feet on either side of the center.

Another specimen chrysanthemum much in evidence at Hirakata Park was trained in the *Senrin Zukuri* style, which means "culture of a thousand blooms." However, most plants on exhibition had one hundred to two hundred blooms. The term dates back to the latter part of the nineteenth century when a plant grown in this manner produced 967 blooms. It was such a horticultural feat that the term *Senrin Zukuri* was coined.

The umbrella-like appearance of a *Senrin Zukuri* plant is produced by careful control of the branching and feeding of but a single container-grown chrysanthemum. Each time that the top half-inch of terminal growth of a stem is removed by the process called "pinching," three breaks, or vegetative stems, will be produced. They are usually equal in vigor, although occasionally one will be starved by the other two and will become weaker. (If so, it is removed

Thistle-shaped blooms of the *Saga* chrysanthemum.

at an early stage.) If a plant were started late in one year and carried through to the blooming season the next year, it would be possible to produce hundreds of stems, but the resultant blooms would have to compete for the available food and might be inferior to those on a plant having a lesser number. Accordingly the grower must compromise in order to obtain the most perfect specimen. As the stems develop, they are tied to a frame which guides their growth towards the ultimate shape. The last pinch must be made approximately from eighty-five to one hundred days before the blooming date so that the blooms will be full and uniform and have sufficient stem length to complete the desired form. As the stems from the last pinch grow, they are tied to the frame and controlled in their development so that each stem produces its single large bloom in an exact position in relation to all others.

The romance and charm of old Japan permeates Kyoto and its surrounding area. It is an unforgettable city, and most suitable for the conclusion of a visit to Japan. We saw our last chrysanthemum display at the Daigakuji Temple which, in itself, matched the feeling imparted by the whole area; and here we saw the *Saga* chrysanthemum, a thistle-shaped bloom never seen in the United States. This type is very old and may be a distinct species, or a natural hybrid. It was found growing on an island in the lake adjacent to Daigakuji Temple and was admired by the Emperor Saga. It has been grown and hybridized at the temple ever since.

The method of growing *Saga* mums is interesting, for it combines standard cultural procedures with a bloom display which tells the story of the *Shichi-Go San Matsuri,* or seven five three festival. Individual plants in containers are displayed with seven *Saga* type blooms approximately half way up the stem, five at the three-quarter position, and three at the terminal point.

The *Shichi Go San Matsuri* is held during November at various shrines, and children, aged three, five, and seven, are taken to the shrines as part of their religious training. They are dressed in their best clothes (Japanese style) and present a very colorful sight as they are accompanied by their mothers, also colorfully attired, to their respective places of worship. We were fortunate in visiting Kasuga Shrine on the day of the Festival.

Before departing on the tour I practiced conversation in Japanese and read all the new material I could find about Japan. I came upon an excellent article, "Fruits and Vegetables of Japan," in *The Garden Journal,* and I made a point of asking for fruit at each place visited.

I expect to conduct a similar tour in 1963 and shall welcome readers of *The Garden Journal* who would enjoy seeing dramatic displays of chrysanthemums on a carefully arranged tour of a beautiful country.

THE ARNOLD ARBORETUM

By DONALD WYMAN

Dr. Wyman is Horticulturist of the Arnold Arboretum, contributor to a number of horticultural publications, and author of several books, the latest *Saturday Morning Gardener,* published by Macmillan Co. in 1962.

THE ARNOLD ARBORETUM owes its origin to the vision and generosity of four men. James Arnold was a New Bedford shipping merchant who, when he died in 1869, left a small portion of a sizeable estate "to George B. Emerson, John James Dixwell and Francis E. Parker, Esqrs., in trust; to be by them applied for the promotion of Agricultural or Horticultural improvements, or other Philosophical, or Philanthropic purposes . . ." The trustees decided to establish a "tree growing garden." At the time, little was known about the specific requirements of such a garden, but the trustees, and especially George B. Emerson, were very much interested in trees and wanted to initiate something decidedly worth while.

The trustees approached officials of Harvard University with this idea, and it was agreed that the University would take the responsibility for acting as permanent trustee for the endowment. The University set aside one hundred and twenty-five acres of the Bussey Farm for the new Arboretum in March, 1872, and Charles Sprague Sargent, the thirty-two-year-old Director of the Harvard Botanic Garden, was appointed the first Director of the Arboretum in November, 1873. Under the terms of the Arnold will, an income of only $3,000 a year was available to convert a farm, partly covered with native trees, into a scientific tree station. The property had excellent possibilities, with several hills and meadows, a brook, small ponds, a rocky cliff, and a grove of native hemlock, but there was great need for cultivation.

Frederick Law Olmsted, Sr., the noted landscape architect, proposed an idea for making substantial improvements despite the small budget, and his proposal was finally accepted. Mr. Olmsted, who was planning a park system for Boston at the time, suggested the possibility of incorporating the Arboretum's land into the park system. (He also had much to do with planning Central Park in New York City.)

A view in the Arnold Arboretum, taken from the bank near the greenhouses, and looking towards the Shrub Collection.

Thus the City of Boston took title to the lands of the Arboretum in December, 1882, leasing the whole tract to the President and Fellows of Harvard for a thousand years, at a rental of one dollar a year, "and so on from time to time forever." The Arboretum received all the advantages of perpetual, tax-free ownership of the land, and in return the University agreed to open the Arboretum to the public from sunrise to sunset during every day in the year, while reserving entire control of the grounds with the exception of the drives and walks.

At the beginning only a small proportion of the potential number of specimens that might be expected to withstand the Boston climate were to be found in any American collection. Hence it was necessary to search North America, as

A spring scene at the Arnold Arboretum: *Rhododendron yedoense poukhanense, Cytisus praecox,* and *Rhododendron nudiflorum.*

The collection of dwarf conifers at the Arnold Arboretum.

well as the far corners of the earth, to procure the thousands of native and exotic plants which make the Arboretum the important scientific station that it is today. The search, which still continues, has included every country in Europe, the Caucasus, eastern Siberia, China, Korea, Japan, Formosa, Australia, Indo-Malaysia, and Africa.

Professor Sargent was commissioned by the Federal government in 1877 to prepare a report on the forest and forest wealth of the nation. This proved an excellent means by which he could obtain American plants not then in cultivation, for he traveled into every wooded region from the Atlantic to the Pacific and chose able assistants from different parts of the country. These assistants continued to supply seeds and specimens and also obtained valuable information on the hardiness and adaptability of the plants in their regions. Close contact with nurseries and botanical gardens in Europe and America enabled Sargent to exchange plants and to acquire many valuable additions for the Arboretum collections.

The first direct consignment of seeds from eastern Asia, sent from the Agricultural College in Sapporo, northern Japan, reached the Arboretum in December, 1878. Since then thousands of plants have been introduced from eastern Asia, chiefly as the result of the travels of Ernest Henry Wilson, an Arboretum staff member from 1906 until his death in 1930, of Charles Sprague Sargent, and of Professor John G. Jack, who brought back plants from Korea. Today correspondents from all over the world are still sending in plant material, some of which is new to America.

Introductions of the Arnold Arboretum

During its ninety years of existence, the Arnold Arboretum has introduced well over three thousand plants new to cultivation in this country, some of them never before grown in gardens anywhere in the world. A majority of these introductions, of course, came from the trips to Japan and China taken by E. H. Wilson and C. S. Sargent, both of whom at the turn of the century sent from the Orient seeds and plants of outstanding ornamental merit.

It is hard to believe that a plant as common as the rock-spray cotoneaster *(Cotoneaster horizontalis)* was one of the "new" and "rare" plants grown in the nurseries of the Arnold Arboretum, yet this is so. Since it was introduced, this plant has proved its usefulness, so much so that it is one of the most common shrubs in our gardens today.

Some of the plants, such as the hardy strain of the cedar of Lebanon *(Cedrus libani)*, are the result of particular missions. The cedar of Lebanon grown in the warmer parts of the United States never proved hardy under New England conditions, so Professor Sargent commissioned a special expedition to Asia Minor to collect seeds from trees growing naturally at their northernmost limit. This was done in the Anti-Taurus and the Taurus mountain ranges, and trees grown from these seeds have proved perfectly hardy in the Arnold Arboretum.

The discovery and subsequent introduction of the dawn redwood *(Metasequoia glyptostroboides)* make a fascinating story. This plant, identified and named from fossil material in 1941, was supposed to have been extinct for millions of years. The identification caused little stir until living plants were found in China in 1945. In 1947 the

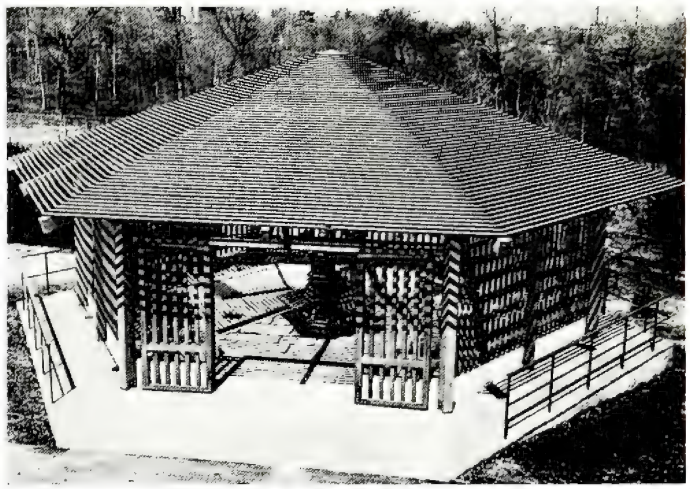
The Groundcover Demonstration Plot at the Case Estates of the Arnold Arboretum.

The Charles Stratton Dana greenhouses, which provide facilities for the plant propagation program of the Arnold Arboretum. Lower Right. The Bonsai House at the Arboretum.

Arnold Arboretum commissioned a special trip to secure seeds of *Metasequoia*, and in 1948 these were distributed to botanical gardens and plantsmen in all corners of the world.

Sometimes the collection of seeds of new plants has been merely a happy coincidence. E. H. Wilson saw a plant in China that was unknown to him and collected some of the seeds. When the plants were grown in the Arnold Arboretum from this original collection, Mr. Wilson was agreeably surprised to see the floriferous and highly ornamental plant later named *Kolkwitzia amabilis*, and commonly called the beauty bush.

Other plants are the result of accident. The beautiful 'Arnold' and 'Dorothea' crab-apples were merely chance seedlings found growing in the Arboretum—their value was noted at flowering time. *Rhododendron obtusum arnoldianum* is another beautiful example of a chance seeding. It



The Street Tree Trial Plot at the Case Estates of the Arnold Arboretum.

was originally growing as a weed among other supposedly more valued plants; when it bloomed, its true worth was quickly noted. Since it has been distributed, it has proved a popular azalea in many nurseries.

More recently, many new plants have occurred as the result of scientific plant breeding at the Arnold Arboretum. *Prunus* 'Hally Jolivette', *Forsythia* 'Beatrix Farrand', *F.* 'Karl Sax', *F.* 'Arnold Dwarf', and *Malus* 'Henry F. duPont', are only a few of them. These have all been introduced to the trade in this country and abroad so that home owners and plantsmen in general can eventually obtain them for ornamental planting.*

The Herbarium

The extremely valuable herbarium of the Arnold Arboretum, justly famous in its own right, has always been the reference source on which most of the many scientific publications of the Arboretum have been based. It is without question the most outstanding herbarium for the study of ornamental woody plants, and from its collection of specimens plants from all over the northern temperate regions

* In "The Passing of a Naturalist," *The Garden Journal*, July-August, 1962, Dr. Caroline Allen writes that Professor Sargent "had long dreamed of a living collection of hawthorns *(Craetaegus)* for future observation and study. Through Palmer this became a reality. After Sargent's death, Palmer took over the tremendous task of revising the classification of the unwieldy group, over six hundred taxa of which were by that time in the living collections alone."

of the world may be accurately identified. The invaluable collections of Wilson, Sargent, and Rehder are represented here. *A Monograph of Azaleas* by Ernest Henry Wilson and Alfred Rehder, published by the Arnold Arboretum in 1921 and still used as a valued reference, is only one of the many publications that have resulted from studies in this world-famous collection of living plants and this extremely valuable herbarium. One augments the other and, together with the library, they make it possible for staff and students to do much basic research in the classification of ornamental woody plants.

The Library

The library, also world-renowned, was started by Professor Sargent. It now contains 51,570 books on woody plants, one of the most complete collections of its kind in the world, and is strictly a reference library—not a circulating one.

The Case Estates

The Case Estate of the Arnold Arboretum is a one-hundred-acre tract situated in the town of Weston, twelve miles from Jamaica Plain. Here is located the Groundcover Demonstration Plot, of one hundred and eighty different groundcovers, each suitably labeled. Adjacent to this is the Street Tree Trial Plot, with one hundred and fourteen street and ornamental trees growing in rows for trial and comparison.

Here also are the major nurseries of the Arboretum, the interesting Small Shrub and Perennial Garden, and the Lily and Narcissus Trial Plots.

Greenhouses

The Charles Stratton Dana greenhouses, completed in 1962, provide excellent facilities for the program of propagation at the Arboretum. These greenhouses were made possible through the income of the Mercer Trust established from the residuary estate of Mrs. William R. Mercer, daughter of Charles Stratton Dana. A cold-storage unit for holding plants over winter, small nurseries, a shade house, a bonsai display house, and various ornamental plantings are included in this area.

Publications

Publications of the Arboretum are of interest to the amateur gardener as well as to the scientifically trained botanist. *Arnoldia* is a popular periodical which appears about twelve times a year and contains many interesting notes on and studies of the hundreds of ornamental woody plants growing in the Arboretum.

The more technical periodicals include the *Journal of the Arnold Arboretum,* published quarterly, with botanical studies of many plant genera, and *Sargentia,* a series of contributions to our knowledge of the woody plants of the world, and issued at irregular intervals. These publications are of particular interest to the professional botanist.

Hundreds of articles and many books on the subject of trees and shrubs have been written by staff members of the Arboretum. An actual count shows that each year for the past twenty-five years Arboretum staff members have contributed an average of seventy-nine articles, totaling one thousand pages, to horticultural and botanical publications of the world.

Such is the Arnold Arboretum. Today it is controlled by the President and Fellows of Harvard University, who act as trustees under the will of James Arnold. It is financed entirely from endowment income and from annual gifts for immediate use. The City of Boston owns the land, polices the grounds, maintains the roads and walks and the fence surrounding it, while the Arnold Arboretum, under the trusteeship of Harvard University, maintains the grounds, buildings, herbarium, and library. The present staff, exclusive of grounds crew and office help, numbers twenty-three individuals.

Nearly six thousand species, varieties, and clones of woody plants are growing within its borders at present. Its library has probably the best special collection of books on woody plants outside the British Museum and its herbarium contains over 742,900 specimens. The publications of its staff members have been accepted as basic by botanists and horticulturists throughout the world. Because of its well-earned reputation, it is one of the leading botanical and horticultural centers of scientific study and experimentation dealing with woody plants.

SOME FRESH-WATER ALGAE

By George J. Schumacher

Dr. Schumacher is Professor of Biology, State University of New York, Harpur College, Binghamton. The following is adapted from Dr. Schumacher's article, "Some Fresh-Water Algae of New York," which was published in *The Conservationist,* an official publication of the New York State Conservation Department, June-July, 1962.

Most people have only a casual acquaintance of fresh-water algae, and their scant knowledge may even be misleading. I have heard the name algae used to describe everything from amphibian eggs to aquatic mosses and flowering plants. This lack of understanding about one of the most diverse and widespread groups of plants is not, however, difficult to understand when one examines the algae more closely.

All the other major plant groups—the lichens, fungi, mosses, ferns, and seed plants—have definite forms which can be seen and recognized with the eye or with the aid of a hand lens. With a few rare exceptions, it is necessary to use a microscope to identify fresh-water algae, and this is probably one reason why the public is not better acquainted with them.

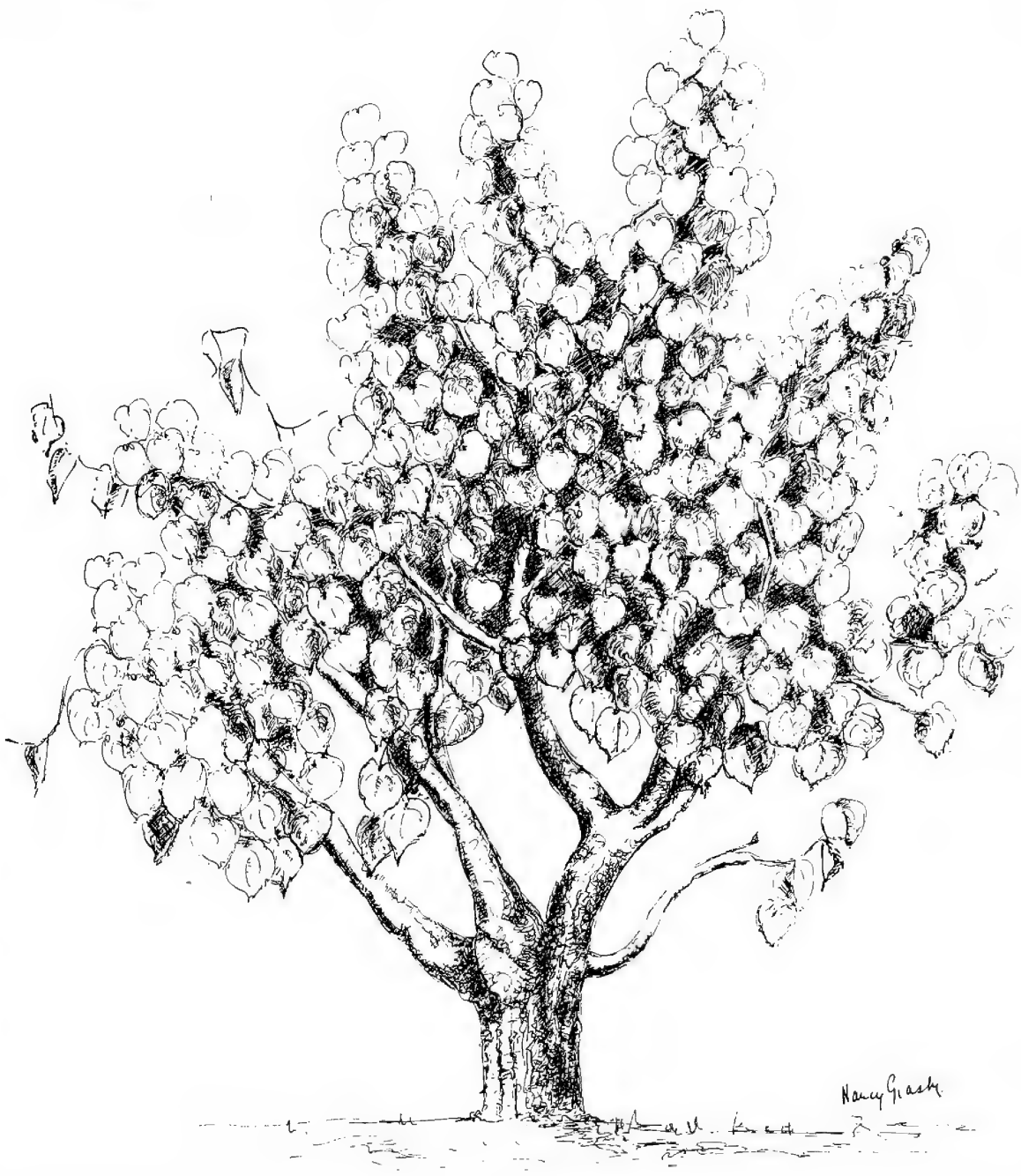
The algae have suffered in another respect. Many other plants have common names by which the naturalist, hunter, fisherman, farmer or gardener can communicate his observation to others. This is not so with algae. I should say that not more than a dozen of the hundreds of fresh-water algae

in the State of New York have true common names. Such names as *Diaparnaldia, Stigeoclonium, Spondylosium,* and *Batrachospermum* have no real meaning to a person not trained in this discipline and do not come easily to his tongue. And so we hear algae called by such time-worn names as "pond scum," "water blooms," "frog spit," or just algae.

These plants are not easily collected, preserved, and identified, but we can increase our appreciation and understanding of them by examining them from several different points of view. As a group they are cosmopolitan in distribution. Their only requirements are moisture and light—and for some species a minimum of both. We find algae in a temporary puddle of rain water which is not more than a few days old, in bird baths which are wet one day and dry the next, in plastic swimming pools which are filled with water from a tap. We find algae tenaciously clinging to the rocks at the lip of a waterfall, where the water pours over at such speed that we marvel that any form of life can become established and maintain itself under such conditions. We find algae as free-floating forms in lakes and ponds, many in quiet pools and the almost stagnant water along the margin of a stream, others in the bubbling, well-aërated water of the rapids.

Since there is a wide range of ecological habitats, we might suspect a wide diversity of types from those algae that are very simple to those that are very complicated. Most students of these plants divide them into seven groups. The division is based upon the type and color of the chloroplast, the kind of food manufactured and stored in the cells, and the reproductive methods.

Generally, the non-specialist or untrained person may recognize four major groups by the color of the cells. These are the blue-greens (Cyanophyta), the greens (Chlorophyta),



The sweet, juicy fruit of the black mulberry *(Morus nigra)* is well known in temperate climates of the Old World. There this mulberry forms a large, spreading tree with strong, horizontal branches. In the Herb Garden of The New York Botanical Garden it is a thickset little specimen, but with a great deal of character. The bark is almost black, the leaves large and dark green, and the habit of growth quite different from that of the white mulberry *(M. albus).* The black mulberry would make a strong, rather quaint, individual specimen in a city garden. N. G.

the yellow-greens (Chrysophyta), and the reds (Rhodophyta). The three others groups are of minor importance compared to the four mentioned or are marine forms.

The blue-green algae are quite simple in their organization, having no true chloroplast or nucleus. In addition to chlorophyll, they contain blue and red pigments which give them their characteristic color. Usually it is a member of this group which forms a blue-green film or scum on moist earth or on the muddy bottom of a puddle, or along the banks of a slow-moving stream. Besides these attached forms, there are free-floating blue-green species (plankton) which are common in warm slow-moving or stagnant waters rich in organic materials.

The green algae are an advancement over the blue-greens. They have chloroplasts and nuclei, yet they include many forms which still possess what are considered to be primitive morphological features and reproductive methods. The green algae interest botanists, because it is from the more primitive types that the higher, more complex types of plants may have had their origin. The fresh-water green algae are more numerous throughout New York State than any other group of algae. The hair-like or feather-like tufts attached to rocks and sticks in woodland streams, running brooks, and wide rivers are undoubtedly green algae. They are frequently attached to submerged aquatic leaves or on wood in ponds and lakes. While the blue-greens generally are more prominent in the warmer months of midsummer, the green usually are prevalent in the cooler waters of spring and fall.

The yellow-green algae contain the interesting diatoms, an important segment of the food chain of aquatic animals. Anyone who has slipped on the slick, brown coating on the rocks on the bottom, in attempting to cross a creek or river, has been introduced to diatoms. Many a fisherman has viewed trout from a prone position after he has lost his footing on an algae-coated streambed. Not all diatoms, however, are found as a gelatinous coating on rocks in moving water. Some are found as a brown muck on the bottom of pools of standing water. Many are epiphytes (a sort of piggyback association) on other algae and on higher aquatic plants, and others are members of the plankton community. The peculiar "pill box" arrangement of the two halves of the cell wall and its very high content of silica make the diatom an ideal potential fossil. The dead and empty cells have been able, in the geological past, to withstand great pressures and in certain areas of the United States have formed large deposits of diatomaceous earth. The presence of yellow and yellow-brown pigments in the cell, along with chlorophyll, is responsible for the yellow-green color of this group. The filamentous *Melosira* is a common diatom in the plankton of slow-moving streams, and *Pinnularia* is a unicellular member of the plankton of ponds.

Red algae are misnamed—at least this is so for most of the fresh-water species. They possess the same red pigments as their marine relatives but not in the same amounts. This variation in the pigment results in color combinations in algae which are usually not red, but gray-green to violet. These algae are larger than those previously discussed and may be seen with the unaided eye. Two, *Batrachospermum* and *Audouinella,* form large, streaming, plumose tufts on twigs or rocks in cool, flowing water—mountain streams and spring brooks are their favorite haunts.

Red algae are not numerous in New York State, but their type of habitat, their beauty, and the ease with which they may be recognized warrant their inclusion in this article.

Economic Importance

Algae have assumed importance in recent years as a possible food during space travel and as a source of food in underdeveloped areas of the world. Practically all the work on both these problems has been concerned with a unicellular green alga called *Chlorella.* This genus has been collected in the plankton of ponds and lakes of this state and of many other states. Some of the experiments with *Chlorella* have produced astonishing results and indicate its potentialities as a source of food in the not distant future.

Many of the algae have a more direct effect, a distinct "nuisance value," that is, they can be obnoxious under certain conditions by causing odors, foul tastes, and slime. The odors have been described as "fishy," "musty," "septic," and "grassy." The "fishy" odors are frequently caused by diatoms, while "musty" odors may be traced to such blue-green algae as *Oscillatoria* and *Nostoc.*

Septic or foul odors are often noticeable under certain conditions which do not permit complete and rapid decomposition of large amounts of algae. The green alga *Hydrodicton* or water-net falls in this category, along with the blue-green *Anabaena* and *Aphanizomenon.* Such genera of Chlorophyta as *Scenedesmus, Spirogyra, Ulothrix,* and *Cosmarium* have been reported as causing grassy odors.

I shall not list the bad-taste algae separately from the odor-producing algae, since any one of the latter is capable of producing a bad taste. The blue-greens are primarily the slime-forming algae but some diatoms also form slime.

Death and severe illness of live-stock, fish, and other wild life have been attributed to algal poisoning and have been so reported in the literature of the past hundred years. Man is not completely immune to the toxicity of certain algae. There have been reports of skin irritation (dermatitis) and hay-fever-like allergies from blue-green algae. Algal poisoning is more frequently reported in the warm summer months, when the amount of light is greatest and algae are reproducing at tremendous rates.

When environmental conditions are ideal, the growth of blue-greens may be so luxuriant as to form "water blooms," giving the pond or lake a pea-soup appearance. This pea-soup appearance is evident every summer on Oneida Lake in central New York. The condition is potentially dangerous, since in the intense sunlight large numbers of decaying and actively reproducing cells may reduce the available oxygen in the water to a point below that which is required by fish and other aquatic fauna. The dissolved oxygen may drop to zero, and a complete kill will result—a phenomenon that is costly to the fisherman, farmer, and naturalist.

Algae play an extremely important and fundamental part in the food chain of fresh-water animals. The exact role of the plankton in relation to such food supplies as organic debris, colloidal substances, and materials in solution is not clearly known, but most workers do not deny that the plankton algae hold a significant position. It is thought that the

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FLORA AND FAUNA WITHIN CITY LIMITS

By ARTHUR W. AMBLER

Mr. Ambler is a Certified Public Accountant and in his leisure time an amateur naturalist and nature photographer. His photographs of nature subjects have been widely exhibited in this country and abroad, and have appeared in many publications. Mr. Ambler is a member of The New York Botanical Garden, the New York Zoological Society, and the National Audubon Society.

MANY PEOPLE, especially city-dwellers, believe that the pleasures of the country are to be had only on their annual vacation. Some whose hobbies are studying and photographing nature feel that they must travel great distances from their homes in order to find flora and fauna upon which they can exercise their talents. It is true, of course, that certain subjects can be found only in their natural habitats, and if interest is focused on such subjects, then it is necessary to visit these areas. With thoughts dwelling on distant places people are prone to overlook their immediate surroundings, but at some point their wanderlust may be satisfied and their attention drawn to their own home territory. It is then that they begin to realize how little they have seen, how little they really know about the living things that are close to them.

City residents, lacking the advantages of those living in suburban or rural communities, resort to parks and undeveloped areas within convenient reach of their homes for field study. Such places contain an appreciable amount of flora and fauna and other aspects of nature for study and photography. However, I shall dwell upon The New York Botanical Garden and some of the nature subjects I have observed and photographed there.

For my purpose I leave the cultivated gardens and enter the wooded area through which flows a river, or I visit the marsh or the pond. Each of these places harbors plants and animals and offers unlimited opportunities to the student and photographer of nature, and pleasure and entertainment to the casual observer. The wooded and rugged parts of The New York Botanical Garden are especially attractive to those who enjoy nature. Generally these regions are less frequented by visitors than are the formal gardens and the Conservatory, and so the plant and animal life is less disturbed. An exception is the Thompson Memorial Rock Garden which, in spite of the number of visitors, attracts a greater assemblage of different kinds of birds than any other place in The New York Botanical Garden. Perhaps this is because of the many trees, shrubs, herbaceous plants, and aquatic features concentrated in a relatively small space. Then, too, many kind-hearted visitors hand out "free lunch" to the wild inhabitants.

There are many delightful surprises within The New York Botanical Garden. I experienced one on the morning of April 15, 1961. After the long cold winter and the miserable weather of March and early April, I entered the Rock

Below. Coltsfoot, *Tussilago farfara.*
Right. Forget-me-not, *Myosotis scorpioides.*

Monarch butterfly, *Danaus plexippus,* is identified by the black spot on the vein of the hind wing. This photograph was taken in The New York Botanical Garden, September, 1962.

Garden. As I stood admiring an early spring blossom, a ruby-throated hummingbird hovered over it and partook of its nectar. This bird is not expected here until about the middle of May, but the beautiful little creature had arrived from the South ahead of its usual schedule. Its presence heralded the approach of spring, that cherished season of the year, promising so many things and stirring the emotions of all true nature lovers.

Birds are present throughout the Garden all year long, regardless of the weather, and a visit for the purpose of observing or photographing them is always rewarding. A few that may be seen the year round are sparrows (several species), crow, cardinal, blue jay, chickadee, tufted titmouse, sparrow hawk, and, of course, the common pigeon. Screech owl and horned owl have occasionally been seen. During the winter of 1962 a long-eared owl perched in a pine tree on the hill east of the Conservatory, and judging by the number of regurgitated pellets at the base of the tree, I concluded it had lodged there for some time. Breaking open several pellets revealed, among other things, the upper and lower mandibles of birds. So the owl, as is its custom, had reduced the small-bird population.

Eastern brown thrasher, *Toxostoma rufum,* beautiful in form and color, takes up residence in The New York Botanical Garden in April and remains until late September. This is a friendly and useful bird, consuming enormous quantities of ants, beetles, caterpillars, grasshoppers, and other insects. The melody of its song has been likened to that of the mocking bird.

Northern blue jay *Cyanocitta cristata*, is one of the best known and most beautiful birds of eastern North America, a frequent visitor to The New York Botanical Garden and especially to the Rock Garden. This particular bird was quite unafraid and friendly so that the author was able to get an image of good size on the film with a 35 mm. lens.

During the spring and fall migrations, many different kinds of birds arrive for temporary or seasonal residence at the Garden, or for a brief rest before continuing their flight. Large numbers will often stop at the Garden during the seasons of migration, if only for a very short while. These are the most interesting periods for bird watchers. As winter ends and the coming of spring brings warmer weather and a progressive change in vegetation, birds come from the South to replace the winter residents that leave for the North. As fall approaches, the picture is reversed; summer residents depart for the South to make way for winter residents that arrive from the North. This change-over is repeated year after year.

Many of the birds in the Garden are quite tame, and it is not unusual for a chickadee, grackle, or blue jay to snatch a morsel of food from a donor's hand. Some birds, not so brave or bold, will come within a few feet of the visitor, if he will place a small piece of peanut on the ground. This is

Purple grackle, *Quiscalus quiscula*, arrives at The New York Botanical Garden early in March and may be seen in increasingly large numbers until early November. This large (eleven to thirteen inches), iridescent black bird will entertain the bird watcher who is willing to feed it peanuts and small pieces of cake or bread.

Muskrat, *Ondatra zibethicus.*

excellent for the photographer, for it enables him to obtain a large image on the film and better detail.

The sky above should not be overlooked, for with binoculars and the ability to identify birds in flight, one can see a number of different species passing over the Garden. If the species cannot be immediately identified, it is interesting to note the manner of flying, soaring, or gliding, and the formation. During present migrations a number of different species of warblers have been "boarding" in the Garden, and bird watchers have been having a field day.

Some of the Birds Observed in The New York Botanical Garden:*

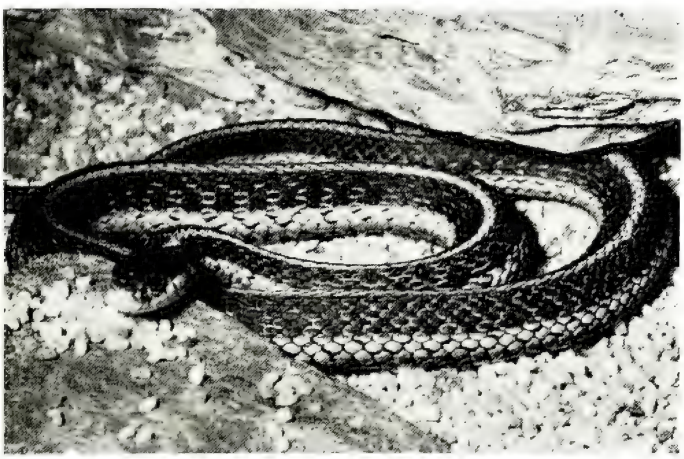
Bluebird, eastern *(Sialia sialis)*
Cardinal *(Richmondena cardinalis)*
Catbird *(Dumetella carolinensis)*
Chickadee, black-capped *(Parus atricapillus)*
Cowbird, brown-headed *(Molothrus ater)*
Creeper, brown *(Certhia familiaris)*
Crow *(Corvus brachyrhynchos)*
Dove, mourning *(Zenaidura macroura)*
Duck
  black *(Anas rubripes)*
  mallard *(Anas platyrhynchos)*
  wood *(Aix sponsa)*
Finch, purple *(Carpodacus purpureus)*
Flicker, yellow-shafted *(Colaptis auratus)*
Fly catcher, great-crested *(Myiarchus crinitus)*
Goldfinch *(Spinus tristis)*
Goose, Canada *(Branta canadensis)*
Grackle, purple *(Quiscalus quiscula)*
Grosbeak, rose-breasted *(Pheucticus ludovicianus)*
Gull, herring *(Larus argentatus)*
Hawk
  Cooper's *(Accipiter cooperii)*
  red-tailed *(Buteo jamaicensis)*
  sparrow *(Falco sparverius)*
Heron
  black-crowned night *(Nycticorax hoactli)*
  great blue *(Ardea herodias)*
  green *(Butorides virescens)*
Hummingbird, ruby-throated *(Archilochus colubris)*
Jay, northern blue *(Cyanocitta cristata)*
Junco, slate-colored *(Junco hyemalis)*
Killdeer *(Charadrius vociferus)*
Kingbird, eastern *(Tyrannus tyrannus)*
Kingfisher, belted *(Megaceryle alcyon)*
Kinglet, golden-crowned *(Regulus satrapa)*
Martin, purple *(Progne subis)*
Nighthawk, common *(Chordeiles minor)*
Nuthatch, white-breasted *(Sitta carolinensis)*
Owl
  great horned *(Bubo virginianus)*
  long-eared *(Asio otus)*
  screech *(Otus asio)*
Oriole, Baltimore *(Icterus galbula)*
Pheasant, ring-necked *(Phasianus colchicus)*
Phoebe, eastern *(Sayornis phoebe)*
Pigeon *(Columbia livia)*
Robin *(Turdus migratorius)*
Red-wing, eastern *(Agelaius phoeniceus)*
Starling *(Sturnus vulgaris)*
Sapsucker, yellow-bellied *(Sphyrapicus varius)*
Sandpiper, spotted *(Actitis macularia)*
Sparrow
  chipping *(Spizella passerina)*
  field *(Spizella pusilla)*
  fox *(Passerella iliaca)*
  house, or English *(Passer domesticus)*
  song *(Melospiza melodia)*
  swamp *(Melospiza georgiana)*
  tree *(Spizella arborea)*
  vesper *(Pooecetes gramineus)*
  white-crowned *(Zonotrichia leucophrys)*
  white-throated *(Zonotrichia albicollis)*
Shrike, loggerhead *(Lanius ludovicianus)*
Tanager, scarlet *(Piranga olivacea)*
Thrasher, brown *(Toxostoma rufum)*
Thrush, hermit *(Hylocichla guttata)*
Thrush, olive-backed *(Hylocichla ustulata)*
Thrush, wood *(Hylocichla mustelina)*
Titmouse, tufted *(Parus bicolor)*
Towhee *(Pipilo erythrophthalmus)*
Vireo, red-eyed *(Vireo olivaceus)*
Waxwing, cedar *(Bombycilla cedrorum)*
Woodpecker
  red-headed *(Melanerpes erythrocephalus)*
  hairy *(Dendrocopus villosus)*
  downy *(Dendrocopus pubescens)*
Wren
  Carolina *(Thryothorus ludovicianus)*
  house *(Troglodytes aedon)*
  winter *(Troglodytes troglodytes)*
Warbler
  black-and-white *(Mniotilta varia)*
  myrtle *(Dendroica coronata)*
  ovenbird *(Seiurus aurocapillus)*
  redstart *(Setophaga ruticilla)*
  waterthrush, northern *(Seiurus noveboracensis)*

* In the July, 1949, issue of *The Journal of The New York Botanical Garden*, there is an article on "Birds in The New York Botanical Garden" by William Drescher.

Eastern chipmunk, *Tamias striatus.*

waterthrush, Louisiana *(Seiurus motacilla)*
yellow-breasted chat *(Icteria virens)*
yellow-throat *(Geothlypis trichas)*

Years ago, when I started to photograph the wild flowers found only within the boundaries of the City of New York, I prepared a list from Britton and Brown's Illustrated Flora of the Northeastern United States. Over a long period of time and considerable mileage, I located and photographed several hundred species. As the list narrowed to the more uncommon plants, the search became more difficult and fruitless, and I concluded that many of the wild flowers



Common garter snake, *Thamnophis sirtalis.*

that were common when I was a boy have disappeared for one reason or another. However, there is a ray of hope that a seed may find a lodging in a secluded spot, where man will not find it—at least not until it has produced some offspring.

Two of the plants on my list, coltsfoot *(Tussilago farfara)* and forget-me-not *(Myosotis scorpioides)* were located this past year. Where? On the grounds of The New York Botanical Garden. These plants are not rare, but they are not common within the City of New York.** During the month of March, the coltsfoot may be seen along the river bank near the Snuff Mill and later the forget-me-not will be seen beside the brook that runs through the Rock Garden.

There are many wild flowers to be studied and photographed, not only in the native plant section of the Rock Garden, but around the pond, along the banks of the Bronx River, and in the woodlands.

Some of the people I have met on my visits to the Garden have expressed a keen interest in wild life other than birds or flowers, and have shown surprise on finding here what they look for only in places remote from the City of New York. In different parts of The New York Botanical Garden, visitors may come upon some mammals, harmless reptiles, amphibians, and, of course, insects.

By far the best-known and most popular of the insects are the butterflies which are undoubtedly attracted by the myriad blossoms. Unfortunately far too many people are removing these lovely creatures with their nets. The monarch *(Danaus plexippus)* seems to find the Garden a particularly inviting place. In late September and early October, the monarch congregates in numbers on one bush—a beautiful picture to see and to record with one's camera—before starting on its southward migration.

On the morning of September 26, 1962, I counted forty-eight monarchs on a stand of New England aster *(A. novae-angliae)* and eight more on other nearby flowers. This was very gratifying, for from all reports there had been an alarming decline in the population of this butterfly in 1960. Some improvement in certain regions of the country was reported in 1961. My recent count may indicate a continued upswing in the cycle.

Besides the ever present and popular gray squirrel, (*Sciurus carolinensis,* both gray and black phases) and chipmunk *(Tamias striatus),* other little creatures roam in the Garden, though they are not seen so frequently: field mouse *(Microtus pennsylvanicus),* rat *(Neotoma magister),* mole *(Scalopus aquaticus),* shrew *(Blarina brevicauda),* muskrat *(Ondatra zibethicus),* and cotton-tail *(Sylvilagus floridanus).*

The photograph of the chipmunk was taken in the wild flower section of the Rock Garden about three years ago, during the season when this little mammal collects and stores nuts for his long hibernation. Since I wanted to observe his activities, I brought along a large bag of assorted nuts. After setting up my camera, I placed two nuts on the railing and waited. Shortly thereafter he arrived and put one of the nuts in his mouth (when I took the picture accompanying this article), then the other nut, and scampered for his home. He followed a circuitous route, which I measured as fifty-two feet, to reach his hole just about fifteen feet from where I had placed the nuts. I placed two nuts on the railing forty-eight times, and he made an equal number of round trips to his hole, totaling 4,992 feet. Of course, his purpose in going the long way was to circumvent any prying eyes from the location of his winter quarters.

Muskrats are fairly common along the river banks, but are not confined to that area. In fact, the Thompson Memorial Rock Garden was host to two muskrats which set up housekeeping in the pond and for some time consumed the well-tended plants. As I listened to the explanations that adults gave to their young companions, I was surprised to

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Bull frog, *Rana catesbeiana.*

** In the January-February, 1961, issue of *The Garden Journal,* there is an article on "The Wild Flowers of The New York Area" by Joseph Monachino.

WINTER VALUE OF ORNAMENTAL SHRUBS IN SOUTHERN GARDENS

By JUNE R. HENDERSON

June Rainsford (Mrs. Peronneau Finlay) Henderson, horticulturist, author, and lecturer, has seriously pursued gardening ever since she became interested in it at her grandmother's home in Edgefield, South Carolina. "Floralia," her own home and garden, is in Aiken, South Carolina. Her achievements have been recognized by the Garden Club of America and by The Garden Club of South Carolina.

THE WEATHER was satisfactory in the Southeast this past autumn. Days were warm, nights were cool, and rainfall was sufficient and well spaced. There was an abundance of flowers from plants of *Camellia sasanqua.* Early-blooming varieties of *C. japonica* had produced fine blooms, and other flowering shrubs gave promise of a good season ahead.

With little warning a mass of cold air descended on this area, and the temperature dropped to near zero in many places. This was an almost unheard-of occurrence. One wondered if plant life was exterminated. After a warming trend for a couple of days and a soaking rain, the extent of some of the damage could be determined. Gardeners had reason to be grateful that there appeared to be few casualties.

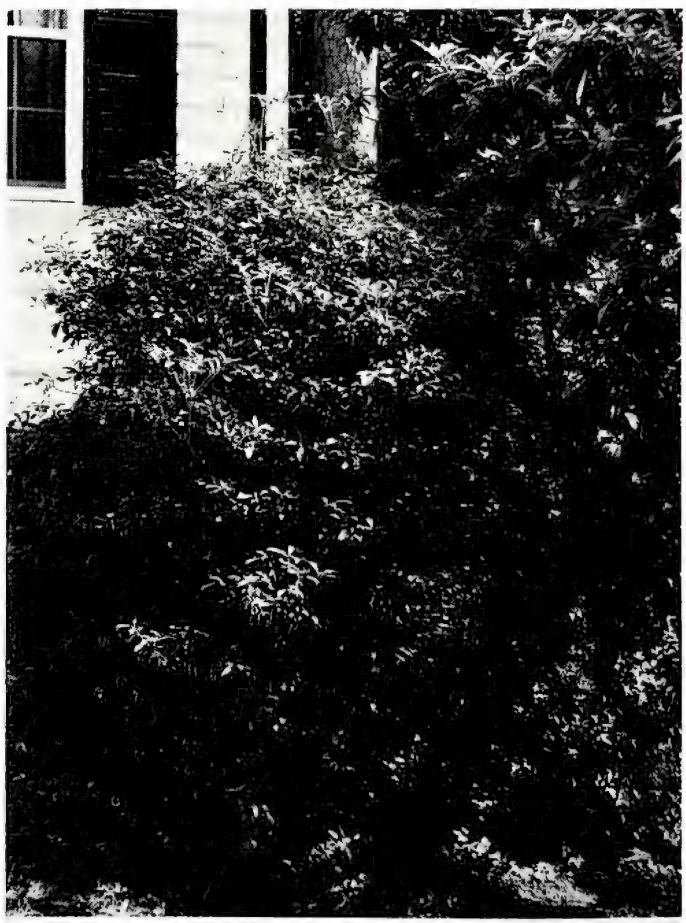
A plant of winter sweet, *Chimonanthus fragrans* (syn. *Meratia praecox*), growing on the east side of a building showed signs of coming to life. The lustrous oblong leaves, which remain evergreen during mild winters, had turned an interesting light brown, and three days after the deep freeze a half dozen flowers opened. Some branches were cut and brought into the house, where for days the rooms were filled with a delightful aromatic fragrance.

This shrub, named for François Victor Mérat, a French botanist of the early nineteenth century, should be more widely used. It is said to be hardy as far north as Philadelphia. In the South, when given protection, meratia reaches a height of from fifteen to twenty feet. The flowers are most unusual. Those of the variety ordinarily seen are a fleshy yellowish green color and have a translucent quality. There is a center of tiny reddish purple petals which contrast with the outer yellow petals. *C. fragrans* var. *grandiflora* has flowers much larger and of a brighter yellow than those of the species.

Often associated with meratia is the native Carolina allspice, *Calycanthus floridus,* which is grown chiefly for its

Below. The osmanthus belongs to the aristocrats among shrubs. This specimen is over twenty-five feet tall and covers considerable area. Periodically, it is a mass of tiny, fragrant, creamy white flowers.

Right. The clusters of fragrant, white flowers of *Cleyera japonica* form pendulous, bright red seed pods. Cleyera thrives well in the semishade of a tall loquat, *Eriobotrya japonica,* to the right.



spicy and fragrant blossoms. These are brown in color and unusual in form. While this shrub flowers from two to three months later than meratia, the two have several characteristics in common. The foliage is similar and they grow in much the same manner, and both are easily propagated from seed, cuttings, and ground- or air-layering. Four species of *Calycanthus* grow in North America, of which *C. floridus* is perhaps the best known and the hardiest; it grows in the wild from Virginia south to Florida. *C. fertilis* grows naturally through the Allegheny Mountains and is valued by herb growers for its medicinal qualities.

Although the buds on many flowering plants were injured by the severe cold, and the forthcoming blooms will be small in size and imperfect in form, the plants themselves, most of which are evergreen, have apparently suffered very little injury. Again the value of these plants is emphasized in that they form the permanent features and create the outlines of gardens.

The dependable performance of some hardy shrubs guarantees them a place in the basic planting of gardens in the South. One that unreservedly qualifies is elaeagnus in its interesting species and varieties. *Elaeagnus pungens, E. pungens* var. *fruitlandii,* and *E. pungens* var. *variegata* have the common characteristic of being dense bushy plants which may attain fifteen feet in height and a spread over a large surface. Pruning is essential in order to keep elaeagnus within bounds and to encourage compact growth. Because the stems are spiny, the dense mounds of green give protection to birds and offer them one of the finest winter homes. Elaeagnus flowers are small, creamy white, and give off a lovely fragrance. *E. pungens* develops red fruit, while that of *E. pungens* var. *fruitlandii* is light pink. These fruits are good food for birds.

The red berries of *Photonia serrulata,* a hardy evergreen in the South, attracts birds.

Elaeagnus in its several species and varieties furnishes desirable shrubs for southern gardens. Above, *Elaeagnus pungens* var. *variegata.*

Photinia serrulata is another evergreen that can be classed in the very hardy group. The leaves are about four inches long, two inches wide, and a rather dull green. The new growth offers striking contrast in that the shoots and leaves are a reddish bronze. In spring photinia produces heads of small white flowers which are succeeded by bright red fruits. During the migratory season the birds swirl about photinia trees and devour the masses of red berries in a very short time. *P. glabra,* another member of this genus, grows from eight to ten feet tall and is a distinctive shrub because of the very bright red of its new growth. Flower arrangers find the stems useful, but as a plant it does not have the solid values of *P. serrulata.*

No planting in this area would be complete without some members of *Osmanthus.* The best known and best loved is *O. fragrans,* commonly called tea-olive. It begins blooming in early spring and flowers intermittently throughout the summer and autumn. It grows compactly and is naturally shapely. There are many varieties of this foliage plant. The osmanthus group belongs to the aristocrats in any shrub planting.

Most of the species and varieties of hollies grow well in the Southeast. The Oriental ones seem particularly happy, probably because growing conditions resemble those in their native habitats of China and Japan. *Ilex cornuta* adds immeasurably to the beauty and distinctiveness of any group of plants. It seems unaffected by any extreme of weather and is easily cultivated. The contrast of its rich green, spiny leaves with the lighter, smooth foliage of other evergreens is most pleasing.

Another native of China and Japan that is cultivated widely throughout the Southeast is the loquat, *Eriobotrya japonica.* Under favorable conditions this handsome evergreen attains a height of twenty-five feet. Its coarse dark green leaves vary in length from six to eight inches. Like the oriental hollies this foliage plant can be used most effectively for contrast of color and form. Among its most desirable qualities are the beautiful fragrant flowers which are produced in early autumn. Provided winter temperatures are not severe, the fruit matures in the early spring. It is

Mahonia bealei, introduced from China over a hundred years ago, is a popular shrub in present-day gardens.

said that in warmer localities where one can be fairly sure of the ripening of loquat fruit, *E. japonica* is planted for the purpose of having its fruits of yellow and orange add to the interior decoration of garden design. These fruits are particularly good background for white flowers and especially those of *Camellia japonica.*

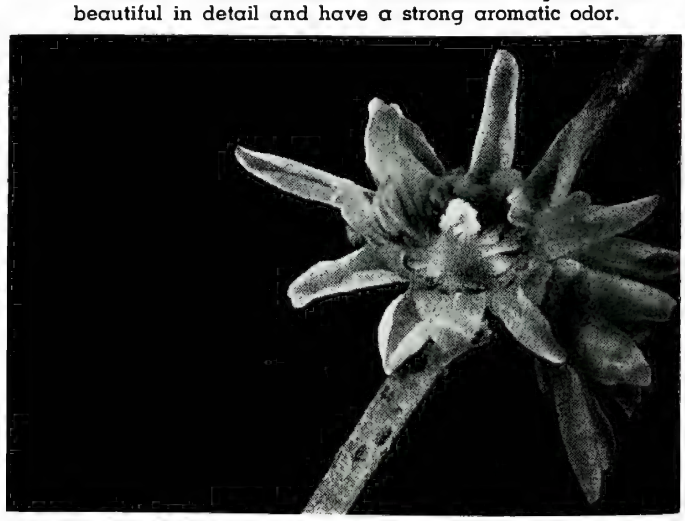
Camellia japonica is another reminder of the generosity of the Orient. The extent of cold damage to the buds of this plant cannot yet be determined, but such hardy varieties as 'Berenice Boddy', 'Drama Girl', and 'Flame' will in all probability enliven the landscape in fairly normal fashion, while others will produce smaller flowers than usual. However, if this handsome shrub never produced blooms, it is worthy of consideration in any planting. Different varieties have different modes of growth; some are tall and columnar and have narrow leaves; others are of medium height and have fairly round leaves; and there are those that are rather dwarf with leaves clothing them to the ground. So it is possible to find a form for any need. It is a complaint of some who are interested in garden design that the enthusiasm for growing camellias, which has increased so rapidly in recent years, has resulted in helter-skelter plantings of this shrub with no regard for composition. Probably to use fewer camellias and place them properly in a planting would be a more satisfactory way of cultivating this exotic evergreen.

While American gardeners are indebted to the Oriental countries for much interesting plant material, many of our own native plants have excellent garden value. The genus *Mahonia* is a large one, some species of which are native in this country. Perhaps the best known is the holly mahonia, *M. aquifolium.* It grows naturally in the northwestern states and is now quite widely cultivated. There is much to recommend this species which grows to a height of five or six feet. The foliage is handsome, each leaf being made up of a number of leaflets. The flower-racemes begin to open their flowers in January or early February and continue to do so into the spring. The small yellow flowers are followed by berries which at first are greenish purple and then become black. The desert mahonia, *M. fremontii,* has flowers quite like those of *M. aquifolium.* This species, outstanding for the blue cast of its foliage, originated in the southwestern states and thrives best in a warm sunny location. One of the popular mahonias in present-day gardens was brought from China by Robert Fortune more than a hundred years ago; this is *M. bealeii.* It has better foliage, more deeply colored, and more beautiful flowers than the native mahonias. All the species are easily grown and propagated. Seeds sprout satisfactorily, and as underground shoots spread, divisions are easily made. Mahonias do not demand any unusual growing conditions, but seem to do better in semi-shade.

One of the smaller shrubs notable for its foliage not only enjoys complete shade but demands it; this is *Aucuba japonica.* Other than shade it requires little else, being easy to grow and easy to propagate, and gives much to the garden picture in return. The handsome foliage varies from deep green leaves to those with much variegation; one, in fact, is known as 'Gold Dust'. The female plants bear big red berry-like drupes. The aucubas enhance the beauty of a shaded garden path in winter and summer. During the summer months pruning is necessary because the plants make such vigorous growth. The severed portions placed in glass jars of water make interesting decorations for the house. In a few weeks strong roots will appear.

A very difficult small shrub is *Daphne* in its several species and varieties. However, its charm, beauty, and fragrance are worth working and waiting for. In many of the beautiful old gardens of the South one generally finds *Daphne odora rubra* and *D. odora alba.* These seem to grow successfully at the foot of pine trees, and throughout the garden one can enjoy their delicious scent. *D. odora* is one of the tallest of the genus, with the Chinese daphne, *D. genkwa,* being next in height. *D. mezereum* is a deciduous shrub of medium height; it bears lilac-purple flowers which are very fragrant. *D. cneorum* has great charm; its low, spreading growth and bright rosy pink, fragrant flowers attract much attention. To bring any of the daphnes into bloom is a rewarding garden experience.

The flowers of winter sweet, *Chimonanthus fragrans,* are beautiful in detail and have a strong aromatic odor.



BROMELIADS

By WALTER SINGER

Mr. Singer, who is Staff Photographer of The New York Botanical Garden, is well informed on bromeliads, having observed and collected them in their native habitats and having grown them outdoors in Florida and indoors in New York.

continued from January February, 1963

CULTURE

WHEN BROMELIADS are planted outdoors, they tend to spread much more than they do when planted indoors, so the gardener should be fully aware of the size a particular bromeliad will attain at maturity. A critical selection of small forms is desirable for the small garden. Bromeliads do not need much care outdoors in California, Florida, and elsewhere in the South when growing conditions are normal. Watering may not be necessary unless the summer is extremely dry. An occasional feeding with a complete fertilizer may be beneficial, but feeding should be done with great care. Do not overfeed! Weak liquid feedings, which are easily given with a proportioner attached to the garden hose, are better than feeding too much or using dry chemical fertilizers. Cultivating must be done carefully; hoeing or cultivating too deeply will injure the roots. Bromeliads with thorny leaves can badly cut the one who cultivates, and protective clothing (gloves and leg protectors) should be worn.

Work and time can be saved by mulching bromeliad plantings. Mulching retains moisture and thus reduces the need for watering; keeps the root system cool; and is a protection against the extreme heat of summer and the cold of winter. Mulching preserves the physical condition of a well-cultivated soil and practically eliminates weeding, which can be quite painful because of the sharp saw-toothed edges of the leaves of some of the terrestrial bromeliads. Leaves or wood chips are excellent mulches for acid-loving bromeliads, and granite rubble is used for the saxicolous types. In Hawaii, long strips of asphalt-treated mulch paper are used for pineapples. Peat moss and sawdust are not recommended, because they draw water from the soil and absorb nitrogen.

These notes on growing bromeliads outdoors apply only to those sections where temperatures do not drop lower than 28° or 25°F. Even at that, success may depend on the variety selected and on the physical condition of the plant.

Bromeliads, when grown indoors, are under man-made conditions, and we learn very quickly that what we think we can accomplish better indoors than outdoors we cannot necessarily do. But by experiment and experience we learn and can correct our mistakes in order to give bromeliads the best possible growing conditions. No one set of rules will be right for all varieties in all areas. In northern areas with shorter day periods, growing conditions will be different from those of the sunny South. Plants are affected by withdrawing or by adding light to their normal day. This sensitivity of plants to light and darkness is known as photoperiodism. The dark period is the more important factor in growth and flower setting than the daylight period. Most bromeliads are affected by adding light or by shutting out daylight before dusk, as was found in experiments (with billbergias) by the Agricultural Research Center of the United States Department of Agriculture at Beltsville, Maryland.

The flower growers' industry has successfully adapted photoperiodism to growing chrysanthemums, lilies, azaleas, and poinsettias. One of the more recent contributions is the so-called "cyclic-lighting." It has been found that interrupting the dark period with intermittent light will hasten the setting of flower buds (as on azaleas) or delay the flowering period (as of poinsettias). Similar work with bromeliads would probably reveal possibilities for increasing their usefulness in the home. With the use of incandescent and various fluorescent lights, an entirely new method of growing plants under artificial light has been opened up for the home grower who cannot afford a greenhouse. Much work is also being done in "growth chambers," which are completely controlled for light, temperature, humidity, and air circulation—factors which influence and stimulate vegetative growth and reproduction.

Some of the new fluorescent tubes provide a color-balanced light which, under proper control, is more beneficial than the varying light of a cloudy or sunny day. Without having to acquire elaborate and expensive light stands, a home owner can provide an excellent source of light for a plant corner in a basement or living room with these fluorescent tubes, for they fit into any fluorescent fixture. The manufacturer's general rules give some idea on the use of these lights for growing plants—in this case, bromeliads: "The distance between the top of the plants and the light source should be approximately twelve to fifteen inches and the duration for sun-loving or long-day plants fourteen to

Bromeliads, artistically arranged, grow in plant stands under artificial light.

eighteen hours, while short-day plants or plants which in nature grow in diffused light or partial shade will require only ten to thirteen hours of light. To secure consistent light application it is recommended that an automatic timer be installed to control the 'off' and 'on' of lights automatically."

In the greenhouse, or in a sunny window, bromeliads may need protection from the midday sun during hot summer months. While some plants benefit from direct sunlight outdoors all year, they may not necessarily do likewise indoors. In the winter months the light in northern parts of the country is weak, and the plants react as if they were being grown partially or totally in shade. The relatively sudden change to strong sunlight will cause severe burning and bleaching of the foliage, especially of those bromeliads that by nature grow in partial shade in the tops of trees or on the floor of the rainforest. Most epiphytic bromeliads like filtered light; morning and afternoon sun are always good for them. If they are in total shade, they will not develop nice form and color. Gray or plain green bromeliads will show reddish tones or purple and silver sheens when grown under proper light. During most of the early spring, in late fall, and throughout the winter, bromeliads should be in a very light place since in our northern latitude the days are then shorter and there is less light than in more southern regions. Between April 15 and September 1, when the sun is strong, some of the more tender bromeliads must be shaded. If one becomes familiar with the normal color and habits of his plants, he will soon find out when the sun is likely to bleach or burn the foliage and accordingly will place them in a safer spot or provide more shade.

Crocks cover the drainage holes in the bottom of the pot that is just large enough to accommodate the roots of a bromeliad.

Circulation of air is imperative with bromeliads, and it applies to every phase of their culture. Good ventilation is a precaution against diseases and insects so long as the ventilation does not turn into cold drafts, especially in cold winters. Aeration should also be considered for the pots or containers, since the roots of bromeliads, particularly of the epiphytes, benefit from air as much as the leaves. Containers or pots with openings on the sides as well as on the bottom, such as orchid pots, permit more air to reach the roots. Do not plunge pots of bromeliads into a medium that may be retentive of moisture. It is better to place them on shelves or to hang them on walls or otherwise suspend them. The more air they get, the better they will thrive. Remember that most bromeliads, especially the epiphytic types, are called "air plants." There is reason for this name.

Although some bromeliads are able to survive extremely high (120°F) and low (20°F) temperatures, this range of temperatures will not concern the majority of bromeliad enthusiasts. Bromeliads, on the whole, do not like high temperatures. The day temperature should be maintained between 70°F and 85°F and the night temperature between 55°F and 65°F. Of course, in the summer they will have to be content with whatever temperature prevails, and that, unfortunately, is not always the most pleasant for either plant or man.

WATERING: When bromeliads are planted outdoors, their water supply depends greatly on the natural rainfall. Only in extremely dry seasons should it be necessary to give additional water, and it can be kept to a minimum by proper cultivating and mulching.

Watering bromeliads grown indoors depends on temperature and general atmospheric conditions. One very important rule must always be observed: every bromeliad that is able to hold water in its leaf-rosette (tank or vase) should always have an adequate supply in its tank, preferably of rainwater because it is free from harmful chemicals (lime in particular). The water reserve held in the rosettes is especially important with epiphytic bromeliads, since their roots are adapted more to anchoring than to absorbing water and nutrients. Roots of epiphytic bromeliads are wiry, hard —sometimes fragile and easily broken. They often exude an adhesive substance by means of which they adhere easily to the supporting plant. Although roots of epiphytic bromeliads do not absorb water, or very little, the cell system at the base of the leaves is able to absorb the water that is stored in the leaf-tanks. No wonder one can find some epiphytic bromeliads on the ground, detached from their host during a windstorm and surviving as long as they are upright enough to retain water in their tanks, while others of the same type have perished because they were in a reclining position and unable to hold water. It is advisable to empty the water from the rosettes once in a while—the way a good breeze does in nature when the wind tips the plant—and then fill it again with fresh water.

While terrestrial bromeliads have roots equipped for water absorption, these roots should not be kept in water-

In using the potting stick, press down on the soil medium, not directly on the stem or roots of a bromeliad.

logged soil, especially when temperatures are low and light is insufficient. Brown tips and yellow or bleached leaves are signs of too much water. It is imperative to use a porous, well-drained soil mixture for both terrestrial and epiphytic bromeliads, and certainly for the saxicolous species.

SOIL MIXTURES: Many soil mixtures have proved successful for growing one or the other variety. The following mixtures have produced good results.

For epiphytic bromeliads
- 2 parts of crushed orchid fir bark
- 1 part of crushed (teased) orchid fiber (osmunda)
- 1 part of leafmold
- ½ part of cow manure (powdered or well aged)
- 1 part of sand

For terrestrial bromeliads
- 2 parts of leafmold
- 1 part of manure
- 1 part of sand
- ½ part of crushed orchid fir bark
- ½ part crushed granite rock

For saxicolous or desert bromeliads
- 1 part soil (compost)
- 1 part sand
- 1 part crushed granite rock, gravel
- ½ part leafmold
- ½ part manure

In all three mixtures, emphasis has been on drainage and porous texture.

Peat moss was not mentioned purposely, because it requires extra care in watering and necessitates feeding. However, if it is impossible to obtain any organic ingredient such as leafmold, fir bark, or manure, then peat moss could be substituted as a last resort.

The potting should be firm, and this is best accomplished with a potting stick. When applying pressure with the stick, press down on the mixture but not directly on the stem or roots, in order to avoid injuring them. The roots must be in close contact with the potting medium, since large air pockets have an adverse effect.

The size of the container is important—just large enough to accommodate the root system and to keep the plant from tipping over. The container should have efficient holes on the bottom for draining off surplus water, and these are to be covered with crocks (broken pieces of flower pots). For epiphytic bromeliads containers with side holes (ventilators) are advantageous—or woven baskets or rafts, such as those used by orchid growers.

The city dweller may find that placing bromeliads in good light is a problem, but additional light from fluorescent tubes is helpful. A south window in the living room is excellent for the desert kinds but harmful for the rainforest bromeliads which need filtered light. It must be constantly emphasized that light is extremely important in growing plants, and particularly so with bromeliads.

FROM SEEDS: Formerly it was believed that seeds of bromeliads should be started in total darkness and often thickly covered, but it is now an established fact that light is necessary for germination and for starting the young seedlings. Of course, the light should not be direct sunlight during germination, but a filtered soft light. High temperatures and ample humidity are the other important factors in starting bromeliads from seeds. Opinions vary about the medium which is best for seed sowing. Some bromeliad growers recommend a mixture of half peat moss and half sponge rock, which is sterilized before it is used. Others recommend a mixture of loam, peat, leafmold, and sand, which is also sterilized.

In recent years there has been a trend toward the use of a sterile medium—vermiculite, perlite, or sphagnum moss—since a sterile medium reduces the incidence of damping-

Sowing seeds of bromeliads on facial cleansing tissue reduces the incidence of damping-off of young seedlings.

off and other diseases. In this vein of thought, I find that sowing bromeliad seeds on facial cleansing tissues (layers of cellulose or fleece paper) has proved to be one of the most successful methods. The tissues are saturated with water, preferably distilled or rain water, and placed in shallow glass (Petri) or china dishes, then covered with glass and transparent paper or cheesecloth to filter the light. The containers are set in a warm, light location. High temperatures and high humidity are often responsible for the appearance of algae in the seed containers. Cleanliness of containers and seeds will prevent losses, and for this reason the cleansing-tissue method seems to be especially useful.

The temperature for good germination should be around 70°F, not less. Germination should occur within ten to twenty days. If germination is retarded or fails to occur, this may be caused by poor viability of the seeds. Bromeliad seeds must be harvested when ripe and sown while they are fresh. Seeds of some bromeliads will not germinate if they are older than three to six months. In the past, when transportation took longer than that from the rainforest of South America to the growers' seed beds in Europe, germination results were not always satisfactory.

The seeds from aechmeas, neoregelias, nidulariums, and others that bear berry-like fruits, must be cleaned of the fleshy substance to avoid fungus growth. For the same reason, it is advisable to cut off the appendage from the hairy seeds of tillandsias, vrieseas, guzmanias, and similar seeds that have the little "parachute" attached. Bromeliad seedlings grow slowly, particularly the epiphytic types that do not have the root system that the terrestrial types develop at an early stage, and it may be necessary to transplant them after several months if algae threaten their well-being. The seedlings will progress well if they are given a very weak liquid feeding after they bear at least three or four tiny leaves. Be careful, for a strong solution will be harmful. Seed pans or seed flats are satisfactory for the first transplanting. The mixture should be light and consist of equal parts of leafmold, shredded sphagnum, fir bark, and sand, finely screened. Bromeliad seedlings can remain from six to eight months in the same mixture.

Offsets are removed from the parent plant with a sharp knife or shears. A sharp cut heals easily.

VEGETATIVE PROPAGATION: Propagation by seeds (sexual) is not the only means of survival in the plant world. Vegetative (asexual) propagation also assures the survival of the species. With some bromeliads, propagation by offsets or offshoots is the safer and more important method, because they produce hardly any seeds, often no seeds, depending upon favorable or unfavorable conditions. Propagation by seeds will be advantageous with species producing a profusion of seeds in a single seed capsule or on a single flower spike. However, all bromeliads are capable of producing offsets and when smaller quantities are wanted, propagation by offsets will be the safer and quicker method.

The habit of growth of offsets differs. Aechmeas send off their shoots far to the side, securing their survival and allowing the mother (stock) plant to remain alive for a relatively long time. Offsets of neoregelias grow close to the parent plant and then push it (the parent plant) to the side, thus obtaining the more favorable "lebensraum" (growing space). Offsets of vrieseas are produced inside the leaf-rosette, close to the flower stem and as they grow, they choke out the parent plant. Most species of *Cryptanthus* form offsets on top of the rosette in leaf-axils; when they are large enough to be independent, they break away from the parent plant. Sometimes one may observe several layers or étages (floors) of offsets on cryptanthus. The time when offsets are produced also differs with the various types of bromeliads and with growing conditions. Some bromeliads produce offsets before, some after, and some during the flowering period. Bromeliads will also produce offsets if the plants are stunted or the center injured by insects or snails so that ultimately they will not be able to produce flowers.

When should offsets be taken off? One group of growers recommends taking them off as soon as possible, while another group prefers waiting until the offsets have developed roots and a sizeable rosette of leaves. Unquestionably an offset should be left on the parent plant until there are at least three or four leaves of good size (on the offset) and until the stem (of the offset) has become woody enough to form a callus. A soft, immature stem tends to rot and thus endangers the new young plant. On many plants, new offsets are produced as soon as the first one is removed, and for that reason some growers follow the practice of taking them off very early. From my own experience I suggest removing offsets as soon as there is some indication of root growth and never throwing away parent plants as long as they have a leaf or a good stem left. Leaving the offsets on the parent plant does not harm either one or the other—and it will strengthen the offset. "Bud-eyes" on bromeliad stems, which otherwise remain dormant, may be awakened by being exposed to light, warm temperatures, and increased humidity and thus may produce more offsets. Here again I have noticed the stimulating influence of light on plant life. In freeing the stems of bromeliads which were potted too low, I found they produced more offsets after such exposure.

Removal of offsets from the parent plant should be performed with a sharp tool—a knife or shears. A sharp cut will heal easily; and as a precautionary measure, I have dusted the cuts with charcoal or rooting hormones.

A well-developed offset may be potted immediately in one of the above suggested potting mixtures. Immature

offsets with soft but not woody stems should be placed in a propagating bed or Wardian case (a terrarium-like container) where they will receive protection from drafts and cold and where the humidity will be high. The rooting medium should be clean sharp sand or a mixture of sand and sterilized peat moss. Potting should be very firm, since there may be no roots or the roots may be too small to anchor the offset. Bromeliad roots often cling tightly to the wall of flower pots, so it is better to break the pot and save the roots. A close, humid atmosphere is beneficial in getting offsets established. They will usually bloom after one year.

Vegetative propagation does not change the natural flowering time of a species. If for one reason or another the offset is not ready to bloom at its natural flowering time, another year will pass before it will come into bloom. The flowering time, the duration, and the habits of the flowers are very important for the survival of bromeliads, since each bromeliad flowers only once in a lifetime. While some flower spikes may last for months, some flowers are very short-lived. While the majority come into bloom in early spring, there are some in bloom all year. This factor places bromeliads high as house plants to fill gaps when seasonal gift plants do not furnish colorful flowers. The actual flowers are often small and unobtrusive; it is the colorful bracts and the large amount of nectar which attract insects.

Some bromeliads, such as *Vriesea splendens, Guzmania monostachys,* and *Billbergia rosea* are self-pollinating. The majority, however, must be pollinated by man or by insects. During the night bees, butterflies, bumblebees, and hummingbirds perform pollination while gathering nectar. Ants, too, do the job, but they often eat up the profit by damaging the flowers. Pollination is difficult when some of the important flower parts, such as the stigma, are deep inside. The flowers of nidulariums open or only partially open during a very short period—half an hour or so. In order to hand-pollinate such flowers, it may be necessary to cut away a petal or two to reach the parts involved.

Temperatures are influential in opening flowers and in the fertility of the pollen. Usually, a sunny and warm day in spring will give better results than a cloudy or cold, wet day in winter. A dry and warm atmosphere is always conducive to successful pollination, as well as the proper ripeness of the pollen. Bromeliad seeds take about five to eight months to develop after which they should be used at once before becoming sterile.

Bromeliads grown from seeds will take about three to five years to come into bloom—a characteristic which does not help them to become commercial items with growers who raise "fast turnovers." The home gardener has the time to wait for a worth-while flowering event.

PESTS: Fortunately, bromeliads are little plagued by insects or diseases. Two scale-armored insects and mealy bugs are the pests that might infest bromeliads. One of the two scales, known as "aechmea scale," a little black, hard scale, can be found on hard-textured-leaf bromeliads such as aechmeas, neoregelias, hechtias, and bromelias. This aechmea scale *(Gymnaspis aechmeae)* was at one time quite a problem for the bromeliad fancier and grower, since it was nearly impossible to control, much more difficult than the soft-shelled brown scale *(Coccus hesperidum).*

Before malathion and parathion were available, insects were usually controlled with so-called "oil sprays," which frequently harmed the bromeliads more than the insects. Both dipping and spraying had to be undertaken away from the sun, and it was dangerous to leave any residue in the rosettes or on the leaves. The new, phosphorus-based insecticides (without an oil base) are very effective and do not injure bromeliads. But extreme caution must be employed when handling plants and insecticides whether it be in a gaseous, spray, or dipping method.

When bromeliads are grown from seeds, young seedlings are sometimes victims of slugs or snails which eat the new soft and sweet foliage. An old remedy is to trap them by putting out pieces of raw potatoes or lettuce at night. In the morning, traps are collected and the captured enemies destroyed. Commercial snail and slug baits are also effective. A plant in good physical condition is less likely to be infested than a weak, sickly plant.

FEEDING: Although many bromeliad growers and fanciers emphasize that it is not necessary to feed bromeliads, I suggest that they try feeding some of the different types and watch the results. There is little reason to feed some of the species or some of the epiphytic types that have narrow foliage and insignificant flowers, but the color and size of flower and foliage of aechmeas, neoregelias, and guzmanias will be improved. I have found that the complete plant foods are better suited for liquid feeding than the organic fertilizers which often carry harmful by-products. Feeding should be done very carefully—rather weak solutions given more frequently than too concentrated solutions at greater intervals. After twenty-four hours it is good practice to empty the leaf-rosettes, by which time enough food should have been absorbed. Foliar feeding has become very popu-

Hand pollination is a delicate and difficult operation with some bromeliads.

In a dish garden of bromeliads, epiphytic types may be set in driftwood—this serves as a support for the plants and as a background to the planting.

lar, but the residue may spoil the decorative foliage of bromeliads.

FLOWERING: The natural flowering dates may be changed intentionally or involuntarily by chemical reaction. The discovery of flower inducement, or stimulation, was accidental. A fire occurred on a place where pineapples were grown, and to the amazement of the owner the pineapple plants were not destroyed, instead they came into bloom and consequently into fruit. After several experiments in Puerto Rico, the results were published in 1932; the effective factor in the wood smoke was ethylene gas which induced flower formation in the pineapple plant. In 1935 Hawaii showed results with acetylene gas, a gas which is easily obtained by applying water to calcium carbide. On my last visit (summer of 1962) to the United States Agricultural Research Center in Beltsville, Maryland, I was shown billbergias treated with rocket fuel. Indications are this treatment is more reliable and more efficient than any of the previous forcing methods, and also is less harmful to the foliage. For the bromeliad fancier who is not familiar with inducing flowering in advance of the natural flowering period, this formula may be helpful: five grams of calcium carbide dissolved in one quart of water, the solution to be poured into the center of the plant (tank) and to remain there for twenty-four hours. Sufficient acetylene gas will develop in that time to affect the flowering period. The solution is then removed and the plant rinsed with water so that no ill-effects may follow the procedure. Bromeliads will usually come into bloom within four to eight weeks after the treatment. Only mature and healthy plants will show good results.

FRESH-WATER ALGAE (Continued from page 48)

larger the plant plankton community, the larger the population of small invertebrates and thus the larger the community of vertebrate animals. The very fact that this is a food chain implies that one link depends on the preceding link which in turn depends on its preceding link and so on. The occurrence of a high plankton count in a lake does not necessarily dictate that the number of game fish will be high. If the intermediate links in the chain are absent, then the chain is broken. If the small invertebrates such as the crustacea, insects, and worms are low in number or completely lacking, then the existence of the vertebrates may be severely curtailed, because they may depend upon the invertebrates for a major portion of their food supply.

Some vertebrates omit the "middleman" and take algae directly as food, feeding upon the plankton and the attached forms as well. The ideal food chain of green plant to herbivore to carnivore to death and decay is then shortened, but the basic steps remain. Since these chlorophyll-bearing plants have the unique ability to harness the sun's energy and to "store it in foods from which it can be obtained by other organisms," their role in helping to maintain life of all sorts in water should not be underestimated.

Until today we have been reconciled to dark and wet and storm, and have forgotten what a spring day could be. Chivalrously defending the winter, we have even disparaged the spring, but it turns out to be all that it should be. . . . It is as though some power has suddenly given the signal "Go!" and everything rushes as it were in a headlong charge.
"March" in *Four Hedges* by Clare Leighton

CONVERSATIONS ON ECOLOGY II

This is a continuation of the series of articles on ecological questions which was inaugurated in the January-February, 1963, issue as a new department of *The Garden Journal*. Dr. Pierre Dansereau, Assistant Director (Botany) of The New York Botanical Garden, and Head of its Department of Ecology, will carry on an exchange of ideas with other ecologists. This year the topic is *Vegetation Management*.
Dr. Frank E. Egler, of Aton Forest, Norfolk, Connecticut, replies to the letter Dr. Dansereau addressed to him in the previous issue. Dr. Egler is a Consulting Vegetationist.

*RIGHTOFWAY RESOURCES OF AMERICA**
RESEARCH DEVELOPMENT EDUCATION

Norfolk, Conn.
January 16, 1963

Pierre Dansereau
The New York Botanical Garden

Dear Pierre:

If I have delayed beyond my initial plans for writing this letter, it is only because your own letter opened the floodgates to such a multitude of musings from my mind that I have been quite unable to segregate any orderly currents of thought, such as are expected of me in this informal yet important means of communication.

I am both pleased and honored—pleased that you have chosen the subject of *Vegetation Management* for the topic of the year, and honored to be the first so addressed. Furthermore, I am gratified that these "conversations" should be emanating from a Department of Ecology, from one of the world's most eminent botanical gardens. I am not trying to toss bouquets simply for the toss-effect: you know it is not my nature to do so. But I do say that the contemporary environment is suitable for the unfolding and blossoming of a new "ecology" that will take its role in human society as a potent construction force. And within this new ecology, I envision a Vegetation Science and a Vegetation Management (using the word vegetation in the technical sense of comprising a complex of plant-communities). The times are not only ripe: the situation is urgent. To say we are at the crossroads is a worn and trite expression. The idea is unusually expressed in two verses under that title which passed over my desk last week (Search and Question No. 24, winter 1962-'63) by Florence G. Mann, a friend and an octogenarian attorney of unusual parts.

"Courage needs the strength of steel. Conform,—
Be as labeled bottles ranged in neat
And ordered rows, the despot world decrees;
Or walk alone. The crossroads all must meet.

Lost, like brooks that join a mirrored lake;
Or ignored, like dreamers wrapped in thoughts ideal.
The rebel lives a lonely life, without
A happy choice. He needs the strength of steel."

I very sincerely feel that the urgency is a matter of national importance, and not simply a marital squabble in our Ivory Tower, a Tower which has become overloaded with Procrustean beds, camouflaged by Beauty-rest mattresses, and made painless by opium fumes. We are living in a strange society today, dominated by the compulsion for an ever-expanding economy. *Production* must be forever accelerating. If it does not, the business world talks, as it has in 1963, of "high-level stagnation" (not smiling over the height of the level, but soured by the stink of stagnation). *Consumption* must be constantly whipped and stimulated into mating with it (to wit, the tax-cut proposals that are currently in the forefront of economic thinking). I sometimes wonder if our society, in the musical world, might not become symbolized by the civilization of the future in terms of Ravel's "Bolero," one long and continuous crescendo, dominated by a maddening hypnotic rhythm, ending in shrieking cacophony.

But enough of these figures of speech. I am not asking anyone to "believe" me. Since many serious thinkers of the time are looking upon walls and finding there written the ominous words "mene mene tekel upharsin," it is time that we do not accuse them of hallucinations, but check to see if they are reading properly. One such attempt I myself made recently** was in reviewing the two pesticide bulletins of the National Academy of Sciences (which some wag has already dubbed my "NASty review"). Be it as it may, the facts at hand led me to conclude the review with these words: "The larger problem at hand, for all strands of this huge social web, is whether or not the integration of free science into society, for its long-term general welfare, is compatible with this short-term economic 'good.' Again and again I am uneasily reminded of certain parallels with Russian Lysenkoism as it started in genetics and spread to all of agriculture. In that case, certain scientific 'principles,' unsound for the long-term general welfare but identified with the national ideology, infiltrated and dominated the highest scientific and governmental institutions in the land. Is it not time to ask whether our own national ideology, in terms of immediate profits production and consumption, is not coming into irreconcilable conflict with the basic core of our free science? It is already late. Would it not be wise to listen to our free scientists, and to weigh what is sometimes only a short-term corporate good against the long-term national good?"

It is logical at this moment to think of Rachel Carson. I have seen countless reviews of her book *Silent Spring*, ranging from the ridiculous (by impassioned individuals from industry who obviously never read it, or even flipped every page) to sound and profound evaluations. I find these reviews so extraordinarily fascinating—from sociologic and psychologic viewpoints—that I am planning to write a "re-

* Research and development directors: Murray A. Buell, Norman H. Dill, Frank E. Egler (Chairman), F. Raymond Fosberg, Richard H. Goodwin, William Niering. Executive Director: Harry E. Van Deusen.

** Pesticides and the National Academy of Sciences. Atlantic Naturalist, 17(4):267-271. Oct.-Dec. 1962.

view of reviews" this spring, to appear as one chapter in a book to be published by a university press, and probably also to appear separately. It is my personal opinion that the importance of *Silent Spring* is and will be in two spheres, firstly in its prime intent, the problem of pesticides, secondly in its larger sphere in the interrelationships of science, industry, and society.

As for pesticides—I have hopes, and fears. *Life* magazine for January 11th is here before me, with an article on the bald eagle, stating that "A midterm report" of the five-year investigation by the National Audubon Society "indicates that DDT can cause sterility and, in fact, is actually killing many of the eagles found dead in the wild." This is one more brick placed in the rising structure, and there will be many more. Too many people, including otherwise sound reviewers, have commented upon the book only in terms of existing known "facts" and "reality." They are like pompous professors, arguing with the little Dutch boy at the dike who is trying to plug the hole with his finger. While analyzing the flow of water through the hole, in all its factual manifestations, these pitiable prognosticators are unconcerned about the environment of the hole, that is, the nature and structure of the big dam itself. And as to the ocean behind, they never studied such a science so unrelated to their own fields of specialization. I am not saying that the little Dutch boy was entirely right. I am saying that he knew enough about dam foolishness, and about the sea around us, so that ecologists and those who respect ecology should promptly bend our ears and our energies. True, we may be conditioned to pesticides as much as one-time China was conditioned to opium, and one-time Japan was conditioned to night-soil. To be weaned is always difficult, especially for children of a larger growth, even though some milk may continue to form an important, though minor, part of our diet. And thus I come to the second of three major thoughts this morning: ecology.

I was trained as an ecologist, and really rather a respectable one, under a man whom I continue to admire, W. S. Cooper. On the other hand, I have repeatedly been disillusioned with the field. The public knows that I have made more than one attempt completely to leave it. In that respect, I consider H. A. Gleason smarter than myself. He did leave it, to bring success and glory to himself, and to The New York Botanical Garden, in another sphere. But then you, Pierre, and others, have repeatedly dragged me back in —whether for good or evil I shall let the future decide. I heard one very definite decision yesterday, for the latter. She even claims to have known me as a boy. I always thought I was abnormally mild and innocuous in those years. If I have changed, it is precisely such persons as she, in local high positions, who have driven me into what she and her companions call "dangerous thoughts." I strongly suspect that in their cases to think at all is to think dangerously. I give these reflections, not by any means as personal criticism. This situation happens to many thinking scientists again and again and again. Ecologists must have the fortitude to keep on thinking, and talking. To think, rightly or wrongly, is better than not to think at all.

I am inclined to the opinion that "plant ecology" as a fussy, tidy, artery-hardened little science, overwhelmed by the fluff of "plant succession" and "climax," is one of the best examples of its own "relict theory." It was an innocent and amusing pastime—as it will long continue to be for some—played according to its own rules, and not harming or benefiting anyone else.

On the other hand, I envision arising somewhere in this country a department, a center, or an institute of ecology that will take its place not only in the U.S.A., but in the world. By "ecology" here I mean an ecosystem-ology, a science involved with the study of those complex "webs": of plants, animals, climate, soil, water, *and* man. A science that integrates into itself (and does not merely ape) the fields of psychology, sociology, economics, and politics. An institute which will consider social issues, and will not hesitate to bring such issues into the open by free and wise discussion, not with fundamentalist finality, but in the manner of Rachel Carson, and with the broadly sweeping comprehensiveness of Albert E. Burke, in my opinion one of the most challenging voices in America today.

Ecology as a science of ecosystems has many inherent difficulties. The ecosystem is not more complex than we think. It is more complex than we *can* think. Treating it as a homogeneous whole, for example in tracing energy relationships, is one approach, and a very valuable approach I do not wish to belittle. Nevertheless, if overdone, that approach can be likened to understanding a cow by running the entire animal through an enormous meat grinder, and scientifically analyzing the resultant hamburger. A monkey might slip in, and never be noticed. The resultant science might express a perfect bovine placidity, but it would take a sharp mental eye to be aware of the monkey business. Thus I still feel that it is logical to have a science of ecology firmly rooted in that strand of the ecologic web which, relatively, "stays put," and allows us to study it. I mean *vegetation.* Beasts and men are far too mobile for a practicable foundational science. They are forever on the move, for food, shelter, or mates. When these urges are satisfied and surfeited, they still move—for money and the security they think it brings. And when surfeited with money, they seem to move all the more, oftener, farther, and faster. Their eyes are now set on Venus, and the Moon, a situation that could well be called both venereal and lunatic.

Vegetation and its *management* I consider the cornerstone for a sound ecology. I admit that the orderly organization and development of such a field is still in the future. If and as it does develop, there are two men I hope to see play major roles in the process, you Pierre, and Ray Fosberg. More so than many others, you have international viewpoints and interests, with competency in your specialist field, combined with proficient awareness of a wide variety of arts and sciences.

I look upon vegetation management as an amalgam, with a liberal dose of its own originality, utilizing new concepts and new techniques. How many, for example, are aware that Rachel Carson speaks favorably of the sound and discriminate use of non-poisonous herbicides on rightofways? Yet the forestry literature on the use of herbicides for the control of weedy hardwoods, and the range literature on the control of unwanted brush, and the industry-provoked literature on the control of everything-that-herbicides-will-kill on rightofways, all these are extraordinarily and glaringly devoid of any ecological sophistication and comprehension.

You simply spray; and spray again when you have to do so. Like taking an aspirin every time you have a headache, without ever asking what causes the headache.

The amalgam of Vegetation Management I foresee will be composed of several elements.

Forestry and foresters have much to contribute, and perhaps will deserve a corner sometime in these conversations. Notice that I say "forestry and foresters." I like foresters, even though one group once threw me out, almost (I resigned, just before). Although I feel that the field is largely empirical, in the sense of being based largely on rule-of-thumb management, the mass of data they have accumulated is enormous, and definitely should be integrated into a Vegetation Science. By temperament, foresters are vastly different from the run of ecologists, and would add very notable values to the resultant whole.

Wildlife as a science is a newer field, and the wildlifers are in process of gaining respect and status among those who are concerned with natural resources. To a great extent they do not manage the animals; they manage the vegetation, for food and cover (like us, managing our habitations for rats, cockroaches, and fleas—before the days of pesticides; now we just hope we are more resistant than those other animals). Wildlife science has much to offer Vegetation Management.

We have the soils specialists. It is beyond the point as to whether soils control vegetation, or vegetation controls soils. They form parts of an interacting whole. It is equally important to be fully cognizant of soil science.

When it comes to weather, man has always had much to talk about. Weather prediction is still somewhat of an art, rather than a science. Like the stock market professionals, they are loudest on foresight and best on hindsight. Our knowledge of meteorology is rapidly increasing, though I look with gloom on the perfection of "weather management." I have lived with the vagaries of New England weather, round the year, since the end of 1945, and I confess that the predictability of the seasons, combined with the unpredictability of weekly and daily details, makes it a femininely fascinating thing to live with. Meteorology, in all its aspects, should be thoroughly integrated into the amalgam.

Water, just water, is part of this ecosystemic web. Whether our interest is in downstream flood control, or in upstream watershed management, our entire comprehension of the water problem can find a focus and a frame of reference in terms of the vegetation, both natural and that which can be induced. True, the technology of dam-building is of overwhelming management importance. But there is nothing basically new here. Beavers must have sewed up the landscape in past centuries, though with far finer stitches. I marvel, moreover, at that gigantic beaver of Pleistocene days. What he must have done to the landscape, and to vegetation! But today we have a beaveroid mutant of the human race, which seems to be operating independently of the wish and welfare of the others. Who knows what the land will be like when those big dam engineers have run their course and have dammed everything that is damable?

I see that I have overlooked range ecology and the range men. I believe there is a sounder all-ecologic basis to range science than to any of the other elements of the amalgam I have mentioned. Perhaps this is only "incidentally" to their credit. The cattle and the sheep (though competing amongst themselves, as do the cattlemen and the sheepmen, and as they have done since the days of Genesis) feed on herbaceous plants. Shrubs invade. And the forest of trees is something to be converted to rangeland. Thus the range ecologist is one who has been forced to recognize the interacting totality of vegetation. Any new vegetation science has much to assimilate from range ecology.

As for agriculture, I have little to say. The agriculturists are, by the very nature of the "vegetation" with which they deal, usually one-year-minded people. They plow and plant, for plentiful produce. The brevity of that cycle is what makes them such avid users of pesticides, and as careless of the future as Aesop's grasshopper, on just a slightly longer time-scale.

It is when we come to urban affairs—and when I see how much I have already written—that I feel I should sign off, not because of lack of interest, but lack of competence. The cities—from slums, through the bedroom towns to the exurbanite areas—are in the process of exploding and spattering themselves over the open lands. It might be said that open lands exist *for* the cities. That depends on your point of view, and it depends upon what streets you walk. Civilization is expressable fully as much in the city as in the country. Each can attain those sublimities of art and culture that make our existence meaningful. The city also is part of that "totality," both consuming and producing for the benefit of a larger ecologic whole. The city too rests upon a foundation stone of Vegetation Management. For that reason I hope I live to see the field of Vegetation Management include men who not only do lip service to economics, politics, and government, to sociology and psychology, but men who can integrate these fields into their own thinking and action.

It is beyond time for me to close. If I have spoken strongly upon these matters, it is because I feel strongly. If scientists themselves will not or cannot rise to the contemporary social needs, then they must both find and encourage such Communicators of Knowledge as Rachel Carson. Our society needs both men and organizations who will further an integrated Vegetation Management, within the context of a larger Ecology. Your interest in this subject, Pierre, is warming. I sincerely believe that the Conversations on Ecology which you evoke on these pages will some day catalyze the bearing of significant fruit. How soon? The last quarter century has not made an optimist of me.

Cordially,
Frank E. Egler

MORE ON THE HERBARIUM

AN ARTICLE ON the Garden's Herbarium appeared in the January-February issue of *The Garden Journal* (pp. 15-17, 23). In it the persons were mentioned who have furthered the taxonomic work of the garden, including the present staff. Unfortunately several persons were omitted from the roster: three presumably because their status was honorary (they were not salaried employees of the Garden); one purely by accident in the passage from typewritten

manuscript to linotype composition. All four have made and are making valuable taxonomic researches and contributions to the published output of the Garden.

Caroline K. Allen is engaged on monographic work with the laurel family *(Lauraceae)*. This family is mostly tropical, and Dr. Allen has recently made an exploratory trip to tropical South America to study the laurels in their native habitats. She has contributed determinations and descriptions of new species to Dr. Maguire's publication on the Guayana Flora.

Mulford Martin, retired librarian, has pursued the study of bryophytes as an avocation, and is now making good use of the E. G. Britton Moss Herbarium and the Library. His activities are many and varied, largely concerned with putting the collection into good order (it has suffered from lack of use). Recently his status has changed from a purely honorary one to that of assistant to Dr. Steere in his work with Antarctic mosses.

Eugene Jablonski has returned to botany (in which he was trained at Breslau) after a long interval in geologic research for industry. He joins in the routine work of the Herbarium and specializes in critical studies on the spurge family *(Euphorbiaceae)*.

Rupert C. Barneby has collected extensively in the West and has assumed the gigantic task of revising the vast and difficult genus *Astragalus* (loco-weeds, ground-plums, milk-vetches, etc.), in which hundreds of species—if they are indeed species—are distinguished only by slight characteristics. Mr. Barneby's monograph on this genus will be a landmark in descriptive botany. H.W.R.

FLORA AND FAUNA (Continued from page 53)

learn how few could identify a muskrat. One young woman told a group of small boys that it was a young beaver, and she would bring them back in the fall to see if it had built a dam!

When some visitors learn there are snakes in the Garden, they immediately grab large sticks with which to "clabber the vicious things to death." Such people seem to labor under the misapprehension that all snakes are venomous and are lying in wait just to sink their fangs in the most convenient person. This is erroneous. When a snake (in these parts) senses danger, it will glide away from man as quickly as it can. I watched a man of advanced years beat to death a small common garter snake *(Thamnophis sirtalis)* in the Rock Garden. He told me he disliked snakes because all were dangerous, and he didn't like to see them swallowing frogs. (I wonder if he ever stopped to think where the animal flesh, which he consumes in his diet, comes from.) The harmless little garter snake was only enjoying its usual particle of food and helping in its way to balance nature. There are no venomous snakes in the Garden.

The most likely amphibians to be found in the Garden are tree frogs *(Hyla versicolor)*, bull frogs, *(Rana catesbeiana)*, green frogs *(Rana clamitans)*, and toads *(Bufo americanus)*. Occasionally I have seen the eastern newt *(Notophthalmus viridescens)*, fence swift *(Sceloporus undulatus)*, spotted salamander *(Ambystoma maculatum)*, and five-lined skink *(Eumeces fasciatus)*. Years ago the latter were fairly easy to find, but in recent years they have become scarce.

During the twilight hours in early spring, around the marshy area near the lake, the chorus of the spring peepers *(Hyla crucifer)* fill the air. These little frogs, three-quarters of an inch to an inch and a quarter long, are plentiful in marshy places, but because of their small size and coloring are difficult to find. Several kinds of tree and other frogs may be seen, but the easiest ones to find are the bull frog and the green frog in the pond in the Rock Garden. If they are unaware of the presence of a human being, their little heads will protrude above the surface of the water; as soon as some one moves too near, there will be an audible splash, as they dive to the bottom and bury in the mud.

Toads are largely terrestrial in their habits, except during the breeding season when they take to the water, and they are to be seen among the grasses, flowers, and bushes. Incidentally, the experts report that toads do not cause warts.

Turtles sun themselves on the banks of the Bronx River or on a log in it. If one has trouble finding a turtle, all he has to do is to trail behind young boys—remarkable how easily they locate the turtles, catch them, and carry them off.

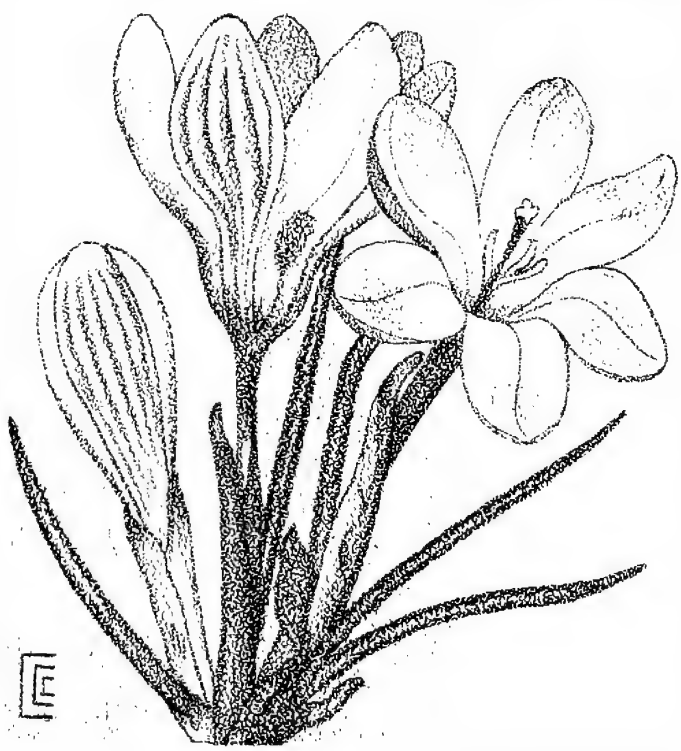
There is a beginning, but never an end to the study of nature, and the amateur naturalist and photographer will find an inexhaustible supply of fascinating material at The New York Botanical Garden.

Now the bright crocus flames, and now
The slim narcissus takes the rain,
And, straying o'er the mountain's brow,
The daffodils do bud again.
The thousand blossoms wax and wane
On wold and heath and fragrant bow.

ANDREW LANG

These most truly are to be reckoned vernal plants, for that they rise not out of the ground until the spring be come in, and are gone likewise before it be past, remaining under ground all the rest of the year.

PARKINSON



JOSEPH VINCENT MONACHINO
1911 - 1962

By BASSETT MAGUIRE

JOSEPH VINCENT MONACHINO was born in Aragona, Sicily, Italy, on May 22, 1911. With his parents he immigrated to the United States in 1916, thus he spent the formative years of his life in America.

The young Monachino gained his early education in primary and secondary schools in Brooklyn, graduating from the Franklin K. Lane High School. In 1934, he received the Bachelor of Science degree from St. John's University, Brooklyn, with major study in chemistry and minor studies in biology and physics. That same year he became a naturalized citizen of the United States.

Monachino was one of the many young men who obtained their undergraduate degrees during the latter period of the "Great Depression." As a consequence, he found himself in the ranks of the Works Program Administration and was assigned in November, 1935, to employment at The New York Botanical Garden. Working here under the supervision of Dr. Harold N. Moldenke, with the title Physical Scientist, he was assigned duties in "Botanical Research." Monachino worked in this capacity for five and a half years. Under the tutelage of Moldenke, he early developed an interest in tropical taxonomy which remained his especial concern for the remainder of his life. He published nine creditable articles during this period of apprenticeship.

In May, 1941, Monachino undertook employment with Merck & Company, joining the staff of B. A. Krukoff whose plant research activities were housed at The New York Botanical Garden. For the succeeding seven years, Monachino carried on identification of miscellaneous specimens and taxonomic study of species or genera that were of interest to Merck. In the identification of fragments that came in from all parts of the world, Monachino developed a perception and acquaintance with a broad spectrum of the world's flora, and at the Garden became able to recognize more plants "on sight" than most members of the staff. In his duties with the drug company, he gained competence in the taxonomic study of plant genera and families having known or potential drug properties: *Strychnos, Strophanthus, Rauvolfia,* the *Sapotaceae, Apocynaceae, Asclepiadaceae,* and others. Thirty articles were published during this period.

At the close of the work of Merck & Company at The New York Botanical Garden, Monachino, in September, 1948, became attached to the staff of The New York Botanical Garden as Associate Custodian of the Herbarium, a post that he held until his death, a period of some fourteen years. In addition to his custodial duties, Monachino continued with active research in the areas of which he had already gained competence. A most creditable ninety-one titles of botanical writings appeared during this culminating phase of his life.

Besides preoccupation with his formal duties, Monachino became a keen and enthusiastic field man. He undertook only one expedition officially, with Dr. John J. Wurdack, for the Garden, that to Venezuela for some five months, September 1955-January 1956. Explorations were carried out in the Maturín region of Estado Monagas, and the Imataca Range of Estado Bolívar and Territorio Delta Amacuro, and of the middle sector of the Orinoco River. Some 2,026 field collections were made, totaling perhaps more than ten thousand specimens, all of interest and much of considerable importance.

Many vacation trips were taken to places in the United States, all to broaden his botanical experience, to collect more plants, and to satisfy his keen enjoyment of the out-of-doors. In New York he became an authority on the local flora and devoted much time and affection to the field programs of the Torrey Botanical Club, of which he was chairman for many years. He became a competent and popular teacher of "Field Botany" at The New York Botanical Garden. Students and friends continue to come to the Garden or to write asking for his assistance in matters having to do with plant life about New York City.

Mr. Monachino devoted twenty-seven years to his botanical profession, all at The New York Botanical Garden. In a bibliography that he himself prepared toward the end of 1961, some 131 titles of published research are listed. This would be a notable accomplishment for a longer life time. The last years of his personal life were sad ones. Joe never recovered from the death of his wife Sophia in February, 1959. During the final years of 1961 and 1962, he was ravaged by serious internal illness, probably of malignant nature, which led to his death on last December 27. Monachino's exceptionally extensive knowledge of plants cannot readily be replaced. We shall all miss him very much.

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL GARDENING

LABORATORY MANUAL IN HORTICULTURE, 5th ed., rev. Denisen, Ervin L. and Harry E. Nichols. 107 pages, illustrated, bibliographies. Iowa State University Press, Ames, Ia. 1962. Spiral, $2.25.

Especially noteworthy in this very excellent manual, by two Iowa State University professors, are the fine line drawings illustrating practices of propagation, pruning, and planting.

THE NEW YORK TIMES GARDEN BOOK. Faust, Joan L., ed. With a preface by Hal Borland. 268 pages, illustrated, bibliography, indexed. (A Borzoi Book) Alfred A. Knopf, New York. 1962. $5.95 until April 30; thereafter, $6.95.

Worth-while articles that have appeared during recent years in the garden pages of *The New York Times*, ably selected and grouped under subjects by its Garden Editor. The photographs, line drawings, planting plans, and general format of this book are good. It is a satisfaction to find in permanent book form the writings of such an impressive assembly of horticultural authors.

FRUIT

FRUIT: A REVIEW OF PRODUCTION AND TRADE RELATING TO FRESH, CANNED AND DRIED FRUIT, FRUIT JUICE AND WINE. Compiled in the Intelligence Branch of The Commonwealth Economic Committee. 209 pages. British Information Services, New York. 1962. Paper, $2.00.

An important contribution to the literature of plant economics, this review gives detailed summaries of fruit and fruit products, international trade, and consumption with special reference to the countries of The Commonwealth. The tabulated statistical data are for the more recent post-war years up to and including 1960 and in some instances, 1961.

GENERAL VITICULTURE. Winkler, A. J. 633 pages, illustrated, bibliographies, indexed. University of Cal. Press, Berkeley, Cal. 1962. $12.50.

Students and members of the grape industry will find this authoritative, definitive work of tremendous value. Professor Winkler, for over forty years associated with the teaching and research staff of the Department of Viticulture and Enology of the University of California, at Davis, has written the text, based on a rich background of knowledge and experience in the raising of grapes.

HOUSE PLANTS AND FLOWER ARRANGEMENT

HOUSE PLANTS. Jones, Margaret E. 208 pages, illustrated, indexed. (Penguin Handbooks, PH73) Penguin Books, Baltimore. 1962. Paper, $2.45.

Margaret Jones, an English nurserywoman with practical experience, has several excellent gardening books to her credit. The present, generously illustrated Penguin Handbook, prepared in conjunction and collaboration with the Royal Horticultural Society, covers a wide range of house plants. It contains sections on potting mixtures, artificial illumination, propagation, and window boxes.

THE NEW MODERN IN FLOWER ARRANGEMENTS. Thomas, Bob. 40 pages, illustrated. (A Margaret Harold Publication) Allied Publications, Nashville, Tenn. 1962. Paper, $1.95.

A stimulating collection of "modern" arrangements with analytical captions and step-by-step diagramatic studies by a popular lecturer who for the past two years has served as General Chairman of the Nashville Arts Festival Flower Show.

PESTS AND DISEASES

THE ILLUSTRATED BOOK OF GARDEN PESTS AND DISEASES. Everett, T. H., ed. 160 pages, illustrated (part colored), Hawthorn Books, New York. 1962. $5.00.

This practical manual is the "Pests and Diseases" section reprinted with revisions from the *New Illustrated Encyclopedia of Gardening*, to update it to 1962. Authoritative, comprehensive, concise, and well-illustrated.

DRUG PLANTS

EXPERIMENTAL PHARMACOGNOSY, 3rd ed. Tyler, Varro E. and Arthur E. Schwarting. 105 pages, illustrated, bibliography. Burgess Publishing Co., Minneapolis. 1962. Spiral, $3.25.

An excellent laboratory manual for the study of plant drugs. In this new edition the key for identification of powdered drugs has been revised and expanded, and the section on chromatography has been updated.

ECOLOGY

FIELD AND LABORATORY GUIDE FOR ECOLOGY. Lemon, Paul C. 180 pages, illustrated, bibliographies, indexed. Burgess Publishing Co., Minneapolis. 1962. $5.00.

A well-presented manual of field and laboratory exercises with collateral reading references with each project. Part I deals with ecological principles and processes; Part II, with ecological techniques.

MANUAL OF FIELD BIOLOGY AND ECOLOGY, 3rd ed. Benton, Allen H. and William E. Werner, Jr. 225 pages, bibliography. Burgess Publishing Co., Minneapolis. 1962. spiral, $3.00.

A revised edition, designed to accompany *Principles of Field Biology and Ecology* by the same authors. Especially useful are the up-to-date supplementary reading lists. A splendid guide for either self-taught naturalists or for students in college biology courses.

BIOLOGY

ANIMAL STRUCTURE AND FUNCTION. Griffin, Donald R. 120 pages, illustrated, bibliographies, indexed. (Modern Biology Series) Holt, Rinehart and Winston, New York. 1962. Paper, $1.75.

A clear, brief presentation, at the college level, of the morphology and physiology of living animal bodies. The carefully executed line drawings and the reading lists at the end of each chapter are useful adjuncts.

GENERAL BIOLOGY; THE SCIENCE OF BIOLOGY, 6th ed. Beaver, William C. 765 pages, illustrated, bibliographies, indexed. C. V. Mosby Co., Saint Louis. 1962. $8.00.

First published in 1939 under the title of *Fundamentals of Biology*. This sixth edition includes important changes and revisions based on new evolutionary theories, modern interpretations of geologic periods, and recent scientific findings.

PLANT MORPHOLOGY

ATLAS OF PLANT MORPHOLOGY. Portfolio II. PHOTOMICROGRAPHS OF FLOWER, FRUIT AND SEED. Fisk, Emma L. and W. F. Millington. 22 pages, 48 plates. Burgess Publishing Co., Minneapolis. 1962. Loose-leaf, $2.75.

A collection of fine photomicrographs with explanatory text, designed as a laboratory aid. Twenty-two flowering plant families are illustrated. Portfolio I, previously published, dealt with roots, stems, and leaves.

FUNGI AND MICROBIOLOGY

MANUAL OF THE RUSTS IN UNITED STATES AND CANADA. Arthur, Joseph C. Illustrations and a New Supplement by George B. Cummins. 438, 24A pages, illustrated, folding map, indexed. Hafner Publishing Co., New York. 1962. $8.00.

A welcome reprinting of a standard text that first appeared in 1934. The new supplement, prepared by Professor Cummins, "provides reference to descriptions of species that are not in the text of Arthur's *Manual* and to other pertinent literature. It does not list new hosts or extensions of range for species represented in the *Manual*".

MICROBIOLOGY AND BIOCHEMISTRY

THE ACTINOMYCETES. Vol. 3. ANTIBIOTICS OF ACTINOMYCETES. Waksman, Selman A. and Hubert A. Lechevalier. 430 pages, illustrated, bibliography, indexed. Williams and Wilkins Co., Baltimore. 1962. $18.00.

Such tremendous progress has been made in the field of antibiotics since the publication of the authors' *Guide to the Identification and Classification of the Actinomycetes and Their Antibiotics* that the publication of this present volume was imperative. Here are pertinent references to recent findings and evaluations.

BACTERIA, 2nd ed. Bisset, K. A. and F. W. Moore. 123 pages, illustrated, bibliography, indexed. Williams and Wilkins Co., Baltimore. 1962. $7.00.

The authors (of the University of Birmingham) state that the principles of bacteriological systematics upon which the first edition of 1952 was based, remain substantially unaltered and that the changes in this edition embody the improvements in the research findings of the last ten years.

BEHAVIOR OF THE LOWER ORGANISMS. Jennings, H. S. With a new introduction by

Donald D. Jensen. 366 pages, illustrated, bibliography, indexed. Indiana University Press, Bloomington, Ind. 1962. $7.50.

This classic, of considerable historical importance, was first published in 1906. Although written primarily from a zoological standpoint, it includes a treatment of many unicellular organisms which are more nearly related to plants than to animals.

BOTANICAL HISTOCHEMISTRY; PRINCIPLES AND PRACTICE. Jensen, William A. 408 pages, illustrated, bibliographies, indexed. (Series of Biology Books) W. H. Freeman and Co., San Francisco. 1962. $10.00.

A clearly written basic text with extensive bibliographies and examples of the employment of histochemical procedures in botanical problems. Useful compilation of chemical supply houses which list reagents mentioned in the book.

CELLS: THEIR STRUCTURE AND FUNCTION. Mercer, E. H. 134 pages, illustrated, bibliography, indexed. (Natural History Library, Anchor Book N 25) Doubleday and Co., Garden City, N. Y. 1962. Paper, $.95.

This was originally published in England under the title *Cells and Cell Structure.* The author of this concisely written introduction to the study of cytology is an electron microscopist in the Chester Beatty Institute of Cancer Research in London.

FUNDAMENTALS OF MICROBIOLOGY, 7th ed. Frobisher, Martin. 610 pages, illustrated (partly colored), bibliographies, indexed. W. B. Saunders Co., Philadelphia. 1962. $8.00.

This standard text was originally published in 1937 under the title *Fundamentals of Bacteriology.* In this seventh edition, as in former editions, obsolete material has been dropped, new chapters added, and the main body of text revised and updated.

PROGRESS IN MICROSCOPY. Francon, M. 295 pages, illustrated, bibliography, indexed. (Inter. Series of Monographs on Pure and Applied Biology; Division: Modern Trends in Physiological Sciences Vol. 9) Harper and Row, New York. 1962. $9.00.

Modern microscopic techniques and instrumentation are extensively described and evaluated by a professor of physics at The Sorbonne, Paris University, and The Institute of Optics.

GEOLOGY

A DICTIONARY OF GEOLOGY. Challinor, John. 235 pages. Oxford University Press, New York. 1962. $5.00.

This compilation of definitions of approximately fifteen hundred geological names and terms was originally written and published in Wales. The quotations and references are principally to British works that were available up to the end of 1959.

HISTORY

THE CARE OF THE EARTH: A HISTORY OF HUSBANDRY. Lord, Russell R. 480 pages, illustrated, bibliography, indexed. Thomas Nelson and Sons, New York. 1962. $7.50.

Russell Lord is a gifted writer with a rare feeling and love for the soil. From him and the late Louis Bromfield the American people have come to realize the necessity of respecting the land on which their lives depend. This present volume is a stirring narrative of agriculture beginning from the "preliterate dawn of history." A dramatic challenge to conserve our heritage.

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MEN, BIRDS, AND ADVENTURE: THE THRILLING STORY OF THE DISCOVERY OF AMERICAN BIRDS. Eifert, Virginia S. 273 pages, illustrated, bibliography, indexed. Dodd, Mead and Co., New York. 1962. $4.50.

Vividly written account of ornithological discoveries in America, starting with prehistoric bird artifacts and continuing with the Norsemen, Columbus, Mark Catesby, Du Pratz, Steller, William Bartram, Captain Cook, Ledyard, Lewis and Clark, Thomas Say, Alexander Wilson, Audubon, Prince Maximilian, Townsend, Nuttall, Collie, Beechey, Gambel, Bell, and many others. The illustrations are reproduced from old and rare prints of classic ornithological works.

NATURE STUDY

ADVENTURES WITH A TEXAS NATURALIST. Bedichek, Roy. 330 pages, map. (Natural History Library, Anchor Book N 7) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

The late Roy Bedichek was an enthusiastic amateur naturalist whose specific locale was his native Texas, but whose writings, devoted to wildlife, visits with other naturalists, homely philosophy, and folklore, have a wide regional scope. The present title first appeared in 1947.

A SENSE OF NATURE. Hay, John and Arline Strong. 128 pages, illustrated. Doubleday and Co., Garden City, N. Y. 1962. $4.95.

John Hay, director of the Cape Cod Museum of Natural History (author of *The Run* and *Nature's Year: The Seasons of Cape Cod*) with Arline Strong, whose specialty is child photography, have produced a beautiful album of pictures and a delightful accompanying text. Here are glimpses of young potential naturalists in their summer wanderings among seashore plants, animals, stones, and shells.

THE STUDY OF BIRDS MADE SIMPLE. Simon, Hilda. 143 pages, illustrated, bibliography, indexed. (Made Simple Books) Doubleday and Co., Garden City, N. Y. 1962. paper, $1.45.

A wide range of subjects is covered in this useful bird-study guide — identification clues, bird feeding, banding, construction of bird houses, feeders, and baths; care of pet birds; bird photography.

THE WONDERFUL WORLD OF NATURE; FAUNA AND FLORA IN 300 PICTURES. Roedelberger, Franz A. 213 pages, illustrated (part colored), indexed. (A Studio Book) The Viking Press, New York. 1962. $7.50.

Superlatively fine photographs (many in color) of European plants and animals, amplified by an excellent explanatory text which is a translation from the original German edition. In the Introduction Edwin Way Teale writes "in all the mounting complexities of an increasingly artificial civilizaton there remains a psychological, a spiritual need for a continuing contact with the realities of nature. Such a book as this, with its hundreds of pictures accurately catching and preserving moments of action and interest in the open, fills for a time this elemental need."

VOCATIONS

CAREERS OUTDOORS. Joseph, James. 345 pages, illustrated, bibliography. Thomas Nelson and Sons, New York. 1962. $5.95.

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NATIONAL PARKS

THESE WE INHERIT; THE PARKLANDS OF AMERICA. Adams, Ansel. 103 pages, illustrated, bibliography. Sierra Club, San Francisco. 1962. $15.00.

Forty-two breath-taking photographs of some of our national parklands, monuments, and seashores with brief inspirational text on national park concepts and ideals. Ansel Adams, a master artist with fabulous lens, presents extraordinary glimpses of our country's scenic resources.

THE YOSEMITE. Muir, John. With notes and an introduction by Frederic R. Gunsky. 225 pages, illustrated, bibliography, indexed. (Natural History Library, Anchor Book N 26) Doubleday and Co., Garden City, N. Y. 1962. $.95.

Frederic R. Gunsky, in the introduction to this paper-cover edition, comments on Muir's tireless energy when traveling and advises the reader not to attempt to cover the distance in the time that the great naturalist (who was in his seventies when he wrote this) suggested. Although fifty years have passed since the appearance of the first edition, this little classic still remains an inspirational guide.

LAND ECONOMICS AND CITY PLANNING

GREEN BELTS AND URBAN GROWTH: ENGLISH TOWN AND COUNTRY PLANNING IN ACTION. Mandelker, Daniel R. 176 pages, illustrated, bibliography, indexed. University of Wisconsin Press, Madison. 1962. $5.00.

The aim of the "Green Belt" program that is being extensively used in England and in Ottawa, Canada, is to preserve rings of open spaces, several miles deep, around cities and to prevent urban development in these areas. Dr. Mandelker, with extensive experience in community planning in this country and a year's study in Great Britain, has written a detailed account of the English city planning problems and solutions.

LAND ECONOMICS RESEARCH. Ackerman, Joseph and others, eds. 270 pages, bibliographies. John Hopkins Press, Baltimore. 1962. paper, $4.00.

Fifteen papers presented at a symposium held at Lincoln, Nebraska, June 16-23, 1961, under the joint sponsorship of Farm Foundation and Resources for the Future, Inc. The contributors of these papers hold important government and university positions in their respective fields of agricultural economics and political science.

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FORESTRY AND CONSERVATION

CONFERENCE FORESTIERE INTERAFRICAINE. SECOND INTER-AFRICAN FORESTRY CONFERENCE, POINTE-NOIRE, 1958. 689 pages, map. (Commission for Technical Cooperation in Africa South of the Sahara, Publ. No. 43) International Publications Service, New York. 1962. 2 Vols. Paper, $12.50.

Over one hundred reports, recommendations, and papers presented at the Conference are included in this detailed survey of African forestry practices, with indigenous and exotic species. (French and English text).

CONSERVATION IN THE UNITED STATES. Highsmith, Richard M., Jr., J. Granville Jensen and Robert D. Rudd. 322 pages, illustrated, indexed. (Rand McNally Geography Series) Rand McNally and Co., Chicago. 1962. $6.50.

Conservation in the United States, historic and present, appraised and presented with fine photographs, maps, and tabulations (many from government sources). A readable, informative, documented, up-to-date text.

THE PRACTICE OF SILVICULTURE, 7th ed. Smith, David M. 578 pages, illustrated, bibliography, indexed. John Wiley and Sons, New York. 1962. $10.95.

The continuation of a work published as a first edition in 1921 by Ralph C. Hawley and now authored by Dr. David M. Smith, Associate Professor of Silviculture at Yale University. Extensive revisions have been made, and a new, comprehensive account of recent developments in herbicides has been added to the present edition.

REGIONAL BOOKS

THE BOOK OF FLORIDA GARDENING. Roberts, Pasco. 104 pages, illustrated. Great Outdoors Publishing Co., St. Petersburg, Fla. 1962. Paper, $1.50.

"Uncle Pasco", well known to listeners of his "Garden Club of the Air" (originating in St. Petersburg), has written this useful Florida garden guide, based on his long experience in answering thousands of requests for practical information on southern gardening problems. Included are excellent planting guides, gardening calendar, and culture notes for fruits, vegetables, grass, flowers, trees, shrubs, and vines.

THE DEVELOPMENT OF BRITISH HEATHLANDS AND THEIR SOILS. Dimbley, G. W. 120 pages, illustrated (part colored), map, bibliography. (Oxford Forestry Memoirs, No. 23) Oxford University Press, New York. 1962. Paper, $9.60.

This memoir is presented in two parts: the first, a comparative study of British heathlands in relation to modern theories on vegetational change and soil genesis; the second containing summaries of the findings from thirty-two sites grouped under the headings of "Place," "National Grid Reference," "Geology," "Topography," "Present Vegetation," and "General Pollen Analysis."

EXOTIC FOREST TREES IN THE BRITISH COMMONWEALTH. Streets, R. J. Ed. by Professor Sir Harry Champion. 765 pages, illustrated, maps, bibliography, indexed. Oxford University Press, New York. 1962. $10.10.

(Continued on page 74)

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. During January and February, 1963, Dr. William C. Steere, Director, attended these meetings: Cultural Institutions Group in New York City; Committee on *Style Manual for Biological Journals,* United States National Committee of the International Union of Biological Sciences, and the Executive Committee of the American Institute of Biological Sciences, all held in Washington, D.C.; and National Selection Committee of Woodrow Wilson Fellowship Foundation, Princeton, N. J. Dr. Steere gave a talk on "Natural Gardens of the Arctic" before the Worcester County Horticultural Society in Worcester, Massachusetts, and on "Arctic Flowers and Their Relatives in Your Garden" at Longwood Gardens, Kennett Square, Pennsylvania. He will be a speaker at the Garden Forum to be held in Greenfield Village, Dearborn, Michigan, the middle of March, 1963, and at the annual banquet of Sigma Xi at Connecticut College on March 13.

Dr. Pierre Dansereau, Assistant Director (Botany), attended a meeting of the Selection Committee of the John and Mary Markle Foundation, of which he is a member, at the Seignory Club, Montebello, Quebec. In mid-January Warren Grabau, Chief of the Area Evaluation Section, Waterways Experiment Station, Vicksburg, Mississippi, spent two days at the Garden with Dr. Dansereau in connection with the latter's preparation of a vegetation map of Puerto Rico. Mr. Grabau was accompanied by B. Benn and E. Ador. Dr. F. Raymond Fosberg, Pacific Vegetation Project of the National Research Council, also visited with Dr. Dansereau.

Three staff members were listed in *Leaders in American Science,* Vol. V, 1962-1963, published by Who's Who in American Education, Nashville, Tennessee: Dr. Steere, Dr. Dansereau, and Dr. P. P. Pirone, Plant Pathologist.

Dr. Pirone prepared the chapter on "Diseases and Pests" included in *The Peonies,* edited by Dr. John C. Wister and published by the American Horticultural Society. He was a guest of the American Dahlia Society at its annual banquet at the Park Sheraton Hotel in New York City on January 19, 1963.

Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, participated in a three-day conference of pathologists and nematologists at the Atlantic and Gulf Plant Quarantine Regions and Plant Importation Branch, held in New York City, December 5-7, 1962. Dr. Rogerson gave a talk and laboratory demonstration on the taxonomy of the dimidiate Ascomycetes, Microthyriales, on the morning of December 6.

Dr. David J. Rogers, Curator of Economic Botany, plans to present four seminars on the use of computers in taxonomy during March for staff members only.

Dr. Arthur Cronquist, Curator, has been elected to the Council of the American Society for Plant Taxonomists.

Dr. Alma Barksdale, Senior Research Associate, and her husband, Dr. Lane Barksdale, Associate Professor of Microbiology at New York University Medical School, visited Puerto Rico in December, 1962, where she collected water molds for her research work at the Garden.

Dr. Annette Hervey, Senior Research Associate, attended the botanical symposium held in Philadelphia, December, 1962, during the meetings of the American Association for the Advancement of Science.

Dr. William J. Robbins, Director Emeritus of The New York Botanical Garden, has been elected President of Fairchild Tropical Garden Association. Dr. Robbins is a long-time trustee of Fairchild Tropical Garden. He was a friend of the late Col. Robert H. Montgomery, founder of Fairchild Tropical Garden and a member of the Board of Managers of The New York Botanical Garden. Dr. Robbins, whose home is in Bronxville, New York, is temporarily living in Washington, D. C., where he is Associate Director, International Activities, National Science Foundation.

Dale E. Sharp, Vice Chairman of the Board of Morgan Guaranty Trust Co. of New York, was elected Treasurer of The New York Botanical Garden, by the Board of Managers at the meeting on January 7, 1963. Mr. Sharp fills the vacancy created by the resignation of R. Gordon Wasson as Treasurer.

The Garden's Orchid Collection was severely damaged during the near zero temperatures and high winds from which New York and other areas suffered the last of December and the first of January. Included in the loss were some irreplaceable, one-of-a-kind-species, many of which had been brought back by members of the Garden's scientific staff from expeditions in South America, Mexico, and Nyassaland.

Losses would have been substantially greater had it not been for the quick thinking of Richard Livellara, a twenty-six-year-old employee in the Gardening Department. He suggested using water from a garden hose to freeze in the glass that was being tossed from the greenhouse by the strong winds. The water, freezing almost instantly, held the panes in place.

The emergency call was sounded at nine o'clock on the night of December 30, 1962, when Tom McGrath, veteran watchman, phoned Louis Politi, Horticulturist. An emergency crew was summoned, and the men climbed the glass structures to weigh down the panes of glass, but the elements made the work dangerous and ineffective. Destruction ceased, however, when the men put young Livellara's suggestion into action.

The measurable losses total five thousand dollars, but this does not include thirty-five orchids which exist in no other collection and would require expeditions to remote jungles to collect again. Nor does the figure include sixty-five orchids which had defied specialists' efforts at identification, some of them possibly new, unknown species.

Also not included is the loss of complete collections of the following genera: *Bulbophyllum, Maxillaria, Lockhartia, Epidendrum, Lycaste,* and *Calanthe.* Three particularly rare and colorful specimens which were lost were *Dendrobium sophronites, Eria floribunda,* and *Symphyglossum sanguinea.*

Tea Set from Japan. Some time before his death, Richard H. Britton gave Sherman Baldwin, a member of the Board of Managers, the tea set that had been presented to his brother Dr. Nathaniel Lord Britton, the first Director of The New York Botanical Garden, by the then Empress of Japan in appreciation of services Dr. Britton had performed for her. Mr. Baldwin recently gave the tea set to the Garden.

Award to *The Garden Journal.* The Printing Industries of Metropolitan New York presented an Award of Merit to *The Garden Journal* for general excellence of publication—lay-out, typography, color reproduction, for intelligence in editing and in presenting material for the layman. The January-February, 1962, issue of *The Garden Journal* was entered in competition by its printers, Interstate Printing Corp., of Plainfield, New Jersey, in the Twenty-first Annual Exhibition of the Printing Industries of Metropolitan New York, held at The Commodore Hotel, January 14-17, 1963.

The Printing Industries is one of the oldest and largest associations of its kind in the United States, having been organized in 1865 under the name of Typothetae of New York City, and now having a membership of more than one thousand printing concerns. Its headquarters has a full-time staff of fifty.

Kodachromes of the Rose Garden Shown in Japan. Seizo Suzuki, Director of Keisei Rose Nurseries, Inc., of Tokyo, Japan, visited the United States early in 1961 with C. Kawasaki, President of Keisei Electric Railway Co. They visited rose gardens, parks, and nurseries, and also the International Flower Show, where they were especially interested in the rock garden exhibited by The New York Botanical Garden.

Later that year Seizo Suzuki wrote to The New York Botanical Garden, requesting pictures of its Rose Garden to be shown in connection with a talk on landscape gardening in America before a meeting of leading railway companies of Japan at Yatsu Rose Gardens. These Rose Gardens are in the corner of the Yatsu Playground of the Keisei Electric Railway Company, which was founded about thirty years ago.

The following letter was received from Seizo Suzuki in January, 1963: "The colored transparencies of your Rose Garden were enjoyed by many rose lovers here. I deeply appreciate your kindness to lend me them.

"I know the people recognized your Rose Garden as a bright, pleasant place surrounded with quiet green woods which emphasize the beauty of colourful roses. Many said that they want to ride on the 'Floral Flyer'. . ."

Manual of Vascular Plants of Northeastern United States and Adjacent Canada, by Henry Allan Gleason and Arthur Cronquist, was published by D. Van Nostrand Co., Inc., in January, 1963.

Torrey Botanical Club. At the annual dinner-meeting, held on January 15, 1963, Dr. Lindsay S. Olive gave his presidential address, "The Question of Sexuality in Cellular Slime Molds." Dr. and Mrs. Olive left shortly after the meeting for the South Sea Islands where they will spend a Sabbatical year in research.

At the meeting held at Fordham University on February 19, 1963, Dr. George M. Woodwell, of Brookhaven National Laboratory, Upton, Long Island, gave a talk on "Ionizing Radiation and the Structure and Function of Ecosystems";

at the March 5, 1963, meeting, held at Columbia University, Dr. Howard Irwin, Research Associate of The New York Botanical Garden, discussed "Botanizing in the Guiana Lowlands."

The program for the remainder of the year is as follows: March 19, 1963, Dr. Theodore Delevoryas of Yale University on "Studies of Fossil Cycadeoids"; April 16, 1963, Dr. Ralph Erickson of the University of Pennsylvania, on "Apical Growth in Caulerpa"; and May 7, 1963, Dr. Chester A. Stock of the Sloan-Kettering Institute, on "Studies in Experimental Cancer Chemotherapy." All these meetings will be held at Columbia University. On May 21, 1963, Dr. A. E. Hitchcock, of the Boyce Thompson Institute for Plant Research, will talk on "Effects of Fluorides on Vegetation" at The New York Botanical Garden.

The New York Mycological Society is holding its winter 1963 meetings at the New York Academy of Sciences. On January 28, R. Gordon Wasson, co-author of *Mushrooms Russia and History,* gave a talk on "The Mushroom Rite in Mexico"; on February 25, Dr. Alexander H. Smith, Director of the University of Michigan Herbarium, discussed "The Russulales."

On March 25, Guy G. Nearing, author of *The Lichen Book,* will give a talk on "The Lichen"; on April 29, Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, a talk on "Species of Amanita in the Northeastern United States."

Field trips will be held on Sundays from May 12 through November 24, 1963, under the leadership of Mr. Nearing.

American Rock Garden Society held its eighth annual winter symposium in the Snuff Mill at The New York Botanical Garden on February 2, 1963. Harry Logan of Westport, Connecticut, gave a pictorial report of the Alpine Plant Conference in England and Scotland which he had attended. H. Lincoln Foster of Falls Village, Connecticut, led a short discussion on "Plants—Loved and Lost," and Henry R. Fuller of Fairfield, Connecticut, on "Late Blooming Favorites." Guest speaker George G. Becker of Chatham, New Jersey, formerly director of the Plant Quarantine Division of the United States Department of Agriculture, Hoboken, New Jersey, gave a talk on "Wildflowers of New Jersey and Where They are Found."

Magnolia Society of America. Dr. J. M. Fogg Jr., Director of The Morris Arboretum, University of Pennsylvania, writes that "there seems to be sufficient interest in *Magnolia,* the fascinating genus of American and Asiatic plants, to warrant the formation of a society which would serve as a clearing house for the exchange of scientific and horticultural information concerning those species and varieties that are in cultivation in this country.

At the XVIth International Horticultural Congress, held in Brussels in September, 1962, the Morris Arboretum was officially designated as the International Registration Authority for cultivar names in *Magnolia.* This will greatly facilitate the efforts of American growers to register new names in this genus.

What is contemplated in the proposed society is a quarterly mimeographed news release which will carry information concerning the status of magnolia culture in the United States. It is suggested that to defray the cost of typing, mimeographing, and mailing, the annual dues be set at $2.00.

If anyone is interested in becoming a charter member of this organization, he should communicate with D. Todd Gresham, 103 Frederick Street, Santa Cruz, California.

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The Horticultural Society of New York, at its annual meeting held at the Essex House, New York City, on January 16, 1963, conferred special awards upon Howard Phipps for his dedicated interest in horticulture as an amateur, his arboretum of many beautiful trees, his hybridization of hibiscus, of peonies, and of rhododendrons; upon Jack Legendre, esteemed plantsman and nurseryman, for his introduction of many fine plants to American gardens; and upon the Bayard Cutting Arboretum, a superbly landscaped place, with a wealth of magnificent trees and shrubs. This is now part of the Long Island Park System through the generosity of Mrs. Bayard James and her mother, Mrs. Bayard Cutting, who established an endowment fund of more than a million dollars for the arboretum. The Society's gold medal was presented to Arno H. Nehrling, Executive Director of the Massachusetts Horticultural Society, for his many contributions to horticulture.

Phil Clark, Assistant to the Director (Public Relations), Robert Jones, Administrative Librarian, and Dorothy Ebel Hansell, Editor of *The Garden Journal,* attended the meeting.

Netherlands Flower-bulb Institute is the new name of the former Associated Bulb Growers of Holland, effective January 1, 1963. Gustave Springer explained that the changed name better expresses the activities of the organization. Mr. Springer's office in New York City will continue to be a central clearing house for information on bulbs and the flower-bulb industry in The Netherlands and responsible for the promotion of Holland bulbs in the United States and Canada.

Raspberry 'Lake Geneva' is a promising variety developed by Phil Robers of Lake Geneva, Wisconsin. It is believed to be a seedling resulting from a cross between 'Latham' and 'Ranere' and has proved to be reliably hardy, withstanding sub-zero temperatures with and without snow covering. The plant is vigorous and prolific, bearing midseason and throughout July in Lake Geneva. The fruit is deep red, firm, and juicy.

Mr. Robers conducts an extensive trial garden at his nursery, in which he grows many varieties well known in the Midwest and several of the fine varieties of Washington and Oregon. He became interested in 'Lake Geneva' in 1948, but did not introduce it until 1959. Two years later, in 1961, he released some five thousand plants to growers in twenty-two states and three Canadian provinces.

Prof. George Klingbell, of the Department of Horticulture, University of Wisconsin, says, "If Mr. Robers' raspberry continues to perform as it has the past several years when I have closely observed it, he may have made a real contribution to horticulture."

Award to Dr. Horsfall. Dr. James G. Horsfall, Director of the Connecticut Agricultural

Experiment Station, received the award of merit for "exceptionally meritorious contributions in plant pathology," at the annual meeting of the northeastern division of the American Phytopathological Society, held at West Springfield, Massachusetts. He was chosen as the first recipient of this award by a committee of five former presidents of the northeastern division.

Dr. Horsfall has contributed to the development of several new fungicides for control of plant diseases and has pioneered in plant chemotherapy. He has written two books on fungicides. He went to the Connecticut station in 1939 as head of the department of plant pathology and botany and was appointed Director in 1948.

Honor to Dr. Fulling

The citation accompanying the Mary Soper Pope Medal, which was presented to Dr. Fulling, Honorary Curator of The New York Botanical Garden, by the Cranbrook Institute of Science at the meetings of the American Association for the Advancement of Science in Philadelphia, December, 1962, follows. The citation was read by Dr. Pierre Dansereau, Assistant Director (Botany) of The New York Botanical Garden.

The Mary Soper Pope medal is awarded, from time to time, by the Cranbrook Institute of Science, of Bloomfields Hills, Michigan, in memory of a lady who lived in the great tradition of the protectors of the arts and sciences. The names of the previous laureates testify to the high purpose of Cranbrook's selection, and to its desire to range widely. In fact, botany is served by many workers: in the field, in the laboratory, in the classroom and, not least of all, in the editorial office.

This year, 1962, it is our privilege to designate Dr. Edmund Henry Fulling, editor of *The Botanical Review*, and to draw the attention of our colleagues in science to the career of a dedicated and perceptive man who has served the scientists of his time in an exceptional manner.

Edmund Fulling was born in New York City on April 29, 1903. His early years were spent in Westchester County (New York), where he attended school at Tuckahoe, Tarrytown, and Bronxville. He was to spend the greater part of his life in the latter town where he lives to this day.

From 1922 to 1926 he attended the New York State College of Forestry at Syracuse University, from which he graduated cum laude. He had probably never intended to become a professional forester, but had developed a keen interest in plants by that time. He found that he could satisfy this best by learning to manipulate, grow, and control them. And this led to his first formal contact with The New York Botanical Garden, where he was hired as a garden apprentice. From 1927 to 1932 he catalogued and labeled trees and shrubs. His *A Guide to the Pinetum* was published in 1929.

In 1931 he returned to formal study as a candidate for the doctorate at Columbia University, where he worked under Henry Allan Gleason. In 1935 he was awarded the degree of Ph.D. for his thesis entitled "Identification, by leaf structure, of the species of *Abies* cultivated in the United States." This was published in the *Bulletin of the Torrey Botanical Club* (Vol. 61, pages 497- 524. 1934).

It is easy to imagine the lively exchanges which must have taken place, in those days, between the young Fulling and the various members of The New York Botanical Garden staff. Dr. H. A. Gleason, whom so many of us consider to be one of the two or three greatest botanists of his generation, was the Head Curator and had conceived the idea of founding a new periodical "interpreting botanical progress." This was a response to a crying need to disentangle the name of specialization, and to render intelligible the acquisitions of a rapidly advancing science. The hardships of keeping up-to-date and the frustrations of interdisciplinary communication stare us starkly in the face now, in 1962, and we may not readily imagine that, in 1934, anyone resisted the idea of putting a "general review" of botany on the market. But the historical truth is that Edmund Fulling had to face the material hazards involved in such an adventure, and to give it long hours of labor.

The first issue of *The Botanical Review* came off the press in January, 1935, and the last fascicle of the twenty-eighth volume was issued a few weeks ago. In slightly more than a quarter of a century, a vast compendium of critical essays has been collected. Many of them stand to this day as the best to be read on their individual subject. This running commentary of botanical science is a synthesis of current work as it relates to previous developments; it is a critique of methods and concepts; and it provides an up-to-date bibliography. No other single source of reference has proved more useful.

These many years, then, Edmund Fulling—in collaboration with H. A. Gleason until 1937—has solicited manuscripts which he has edited and published in *The Botanical Review* at The New York Botanical Garden. The judicious choice of collaborators for his editorial board, the diplomacy of suggested alterations and changes, the incredibly meticulous checking of references and scanning of proofs, the battle with printers and subscribers have exercised and sharpened his wits in the course of these years and have provided the proof of a happy gamble. For that is what it was during many years, as he bore not only the administrative authority but the financial liability as well. The New York Botanical Garden relieved him of this only in 1962.

This absorbing task, however, did not prevent Edmund Fulling from taking on yet other responsibilities. He was business manager of *The American Journal of Botany* from 1940 to 1944, and treasurer of The Torrey Botanical Club in 1945. Moreover, in 1947, he founded, edited, managed, and published yet another important botanical periodical, *Economic Botany*, and stayed on that job until mid-1957. It was only fitting that in 1958 he be given the Distinguished Service Award by The New York Botanical Garden and appointed Honorary Curator in 1959.

He has been a familiar figure at scientific meetings where his good-humored questions on current research always showed the sharpness of a critical though generous mind. He has also very widely traveled, with his charming wife, Marguerite, and made valuable contacts for *The Botanical Review* and The New York Botanical Garden. At the same time his keen interest in archaeology, art, and folklore was satisfied and his talents as a photographer well used.

In spite of an often precarious health, he has found it possible to publish many papers, mostly on man's many uses of plants, on legislation concerning plants, and on industry, but also a scholarly commentary on "Thomas Jefferson's interest in plant life as revealed in his writings." He was also able to undertake the translation of several important works, from the French and the German, that needed to be known to the English-speaking reader, foremost among them Hans Molisch's book on *The Longevity of Plants*. This, like much of Edmund Fulling's work was a labor of love, if the truth be known, the only labor worth doing.

In 1962, therefore, one has the feeling that it is the whole community of botanists that recognizes its very special debt to Edmund Fulling in applauding him as the recipient of the Mary Soper Pope medal.

Rehabilitation of the Botanical Gardens, Kyoto, Japan, has begun. It suffered much from neglect during World War II and still more from nearly fifteen years of Occupation Troops.

Occidental species and cultivars of the following families and genus are particularly requested: *Begoniaceae, Gesneriaceae, Iridaceae, Magnoliaceae,* and *Hydrangea*. Surplus materials will be most welcome. Please send them to: Dr. Y. Tsukamoto, College of Agriculture, Kyoto University, Kyoto, Japan.

People-To-People, Committee on Trees. People who would like to correspond with those

The face and reverse of the medal of the Mary Soper Pope Memorial Award.

in foreign lands interested in trees (or other woody plants) are urged to send their names (and fifty cents in stamps or coin) to the Chairman of the Tree Committee. He will match them with someone in a foreign land who is similarly interested.

The Committee needs to know approximate age, occupation, whether one can write in any foreign language, and what, if any, special interests in woody plants. Send information to: Ralph M. Crowley, MD., Chairman, Committee on Trees, People-To-People, 141 East 55th Street, New York 22, N. Y.

"Garden Tours the World over 1963," under the sponsorship of the Rhode Island Horticultural Society, Massachusetts Horticultural Society, Michigan Horticultural Society, and Ontario Horticultural Society, are arranged by Jean Burke Travel Service, Inc. A European spring garden tour is scheduled to leave New York City on April 4, 1963, on the "Cristofo Colombo," and to depart from Southampton, England, on May 23, 1963, on the "Queen Mary." The itinerary includes Naples, Rome, Perugia, Florence, Venice, Stresa, and the Italian Lakes; Amsterdam, Brussels, Paris and London.

Henry E. Downer, formerly Horticulturist of Smith College, now Horticulturist Emeritus of Vassar College, author and lecturer, will conduct the tour.

Information on this European tour, also on tours to Hawaii and Mexico, sponsored by these four horticultural organizations, may be obtained from Arno Nehrling, Executive Secretary, Massachusetts Horticultural Society, 300 Massachusetts Avenue, Boston 15, Mass.

Kirstenbosch Jubilee Tour of South Africa will be conducted by Elizabeth Scholtz, a staff member of the Brooklyn Botanical Garden. The tour will arrive in Johannesburg on September 17, 1963, and depart from there October 9, 1963. The itinerary includes visits to the Kirstenbosch National Botanical Gardens, Capetown Botanical Gardens, Karoo Succulent Gardens, Kango Caves, "The Garden of Eden" Forest Reserve, and other points of interest.

South African Airways, in association with British Overseas Airways Corporation, offer daily jet flights between London and Johannesburg. Interested parties should direct their inquiries to Miss Scholtz at the Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, N. Y.

Visitors to the Garden.

Wilhelm Margadant, Assistant Librarian, The Rachel McMasters Miller Hunt Botanical Library, Pittsburgh.

Dr. Lyman B. Smith, and Dr. William L. Stern, Smithsonian Institute, Washington, D.C.

Dr. Rastinii Rasid, Botanical Gardens, Indonesia, Bogor.

Dr. Tiamjai Komkris, Kasetsart University, Bangkok, Thailand.

Dr. Geneva Sayre, Russell Sage College, Troy, N. Y.

Dr. W. Johnson, Rutgers University, New Brunswick, N. J.

N. Ginsberg, Department of Landscape Architecture, Berkeley, Calif.

Mr. and Mrs. Salvadore Dali, Barcelona, Spain.

Dr. Richard A. Howard, Director, Dr. Lorin Nevling Jr., Dr. Bernice G. Schubert, Peter Green, and Dulcie A. Powell, Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. Frans A. Stafleu, Utrecht, The Netherlands.

Dr. William L. Theobold, University of California, Santa Barbara.

W. Hardy Eshbaugh, Indiana University, Bloomington.

George Alderson, Reed College, Portland, Ore.

Duncan M. Porter, Harvard University, Gray Herbarium, Cambridge, Mass.

Dr. John and Charlotte Reeder, Yale University, New Haven, Conn.

Dr. J. J. Copeland, Department of Botany, City College of New York, N. Y.

Dr. Edward Gerber, University of Chicago, Chicago, Ill.

Dr. Stuart Dunn, University of New Hampshire, Durham.

J. A. Fowler, Henry Ford Museum, Dearborn, Mich.

Dr. Jacques Lipetz, Dr. Ulrich Naf, and Dr. Tom Stonier, of Manhattan College, Bronx, N. Y.

Dr. J. L. Blum, Canisius College, Buffalo, N. Y.

R. N. Chopra, Department of Botany, Delhi University, India.

Stanley J. Smith, New York State Museum, Albany.

Dr. Thomas Goreau, University of the West Indies, Mona, Jamaica, spent several days consulting the marine algae collections. Dr. Goreau gave the Garden fifty-five specimens of algae, including some new species collected off the coast of Jamaica.

Wendell Holmes Camp, formerly Associate Curator of The New York Botanical Garden, died on February 4, 1963. Dr. Camp was a member of the Garden's curatorial staff from 1936 until mid-1949. At the time of his death, he was Head of the Department of Botany of the University of Connecticut.

Roland E. Wells died on January 9, 1963, at the age of seventy-five. At the time of his death Mr. Wells was Chief Engineer of The New York Botanical Garden, a post he had held ever since he entered the service of the Garden on October 15, 1909.

Horace Martin, who was employed at The New York Botanical Garden from March 30, 1910, until he retired on September 1, 1953, died on January 24, 1963, at the age of seventy-eight. At the time of his retirement Mr. Martin was a foreman gardener.

REVIEWS OF BOTANICAL BOOKS

INTRODUCTORY MYCOLOGY, 2nd. Edition. Alexopoulos, Constantine John. Art work by Sun, Sung Huang. 613 pages, 194 figures, glossary, indexed. John Wiley & Sons, New York. 1962. $12.00.

The progress of modern mycology since the first edition (1952) of Dr. Alexopoulos' introductory mycology text has been so great that this second edition is virtually a complete revision. Not only is much of the material rewritten and updated, but considerable additional information has been included: physiology of reproduction, special chapters on formerly little-known groups, the parasexual cycle, electron microscope findings, expanded bibliographies, expanded sections on human pathogens, revised keys to orders of fungi, etc. To keep within a reasonable size, the treatment on bacteria and the chapter summaries have been omitted.

Morphology and taxonomy continue to form the basis of discussion, but significant physiologic and genetic knowledge is included.

Major changes in the classification have been made. The slime molds are no longer placed in a separate division but are included as a class of the fungi (Mycota). The cellular slime molds are included in orders of uncertain affinity. The heterogeneous lower fungi (Phycomycetes) are now distributed into five classes. Considerable reorganization of the Ascomycetes results from newer ideas on classification. The discussion on imperfect fungi has been considerably expanded, and revisions in the Basidiomycetes are amply considered. Only the brief chapter on lichens remains essentially the same.

Although written primarily for an introductory course, it will undoubtedly be adopted and used by most students and teachers of mycology. The book will become the standard text and reference book to introduce and pursue a study of the fungi.

CLARK T. ROGERSON

THE SAVORY WILD MUSHROOM. McKenny, Margaret. 133 pages, illustrated, indexed. University of Washington Press, Seattle. 1962. $3.95.

This Pacific Northwest field guide to mushroom hunting was written for the amateur mycologist and gourmet. To answer the question, "Is it good to eat?" eighty-four common mushrooms are considered, including sixty-three edible mushrooms, fourteen poisonous mushrooms, and seven nonpoisonous mushrooms to be avoided. Thirty-three are illustrated with black-and-white photographs, forty-eight with colored photographs. Color reproduction for some is excellent, but for others it is very poor. Caution will be needed in identifying specimens from the photographs. A brief description of each species—its color, size, habitat, season of growth—and remarks on distinctive features complement the illustrations as a means of identification. An outstanding part of the book is a section of mushroom cookery with forty-one recipes. A section on mushroom poisons was contributed by Varro E. Tyler.

While written primarily for the mushroom hunter of the Pacific Northwest, many of the species are found in other parts of the country. The book will be useful to anyone interested in mushrooms.

CLARK T. ROGERSON

BOOK REVIEWS (Continued from page 70)

A comprehensive, encyclopedic summary of the observations of growth, culture, and uses of introduced forest trees in the countries of the British Commonwealth, compiled from reports submitted to the seventh Forestry Conference of the British Commonwealth. This massive work is intended as a revision of Professor R. S. Troup's *Exotic Forest Trees in the British Empire* (1932).

MEMORIAL EXHIBITION

of the photographs of the late William H. Schleisner

About forty photographs, taken by Mr. Schleisner, horticultural and architectural photographer, are being shown in the Museum and Administration Building of The New York Botanical Garden. The exhibition, which opened on February 7, 1963, will close on April 1, 1963.

The photographs, in color and black and white, primarily feature plants and gardens and were selected by Samuel Gottscho, Mr. Schleisner's father-in-law and partner throughout his professional life.

THE GREAT DISMAL SWAMP: ITS HISTORY, FOLKLORE AND SCIENCE, rev. ed. Davis, Hubert J. 190 pages, illustrated. The Author, 143 Carolina Ave., Portsmouth, Va. 1962. Paper, $2.45.

"Capricious, contradictory and alluring" are the author's adjectives for a swamp that straddles the Virginia-North Carolina boundary line, whose deceiving name wrongfully connotes darkness and gloom. To many famous persons—George Washington, Patrick Henry, Harriet Beecher Stowe, Henry Wadsworth Longfellow—this naturalist's haven, abounding in rare plants and animals, had brightness, beauty, and charm. This little book gives delightful glimpses of the inhabitants of this intriguing place through the medium of fascinating historical, legendary, and scientific notes and stories.

MEET FLORA MEXICANA: AN EASY WAY TO RECOGNIZE SOME OF THE MORE FREQUENTLY MET PLANTS OF MEXICO AS SEEN FROM THE MAIN HIGHWAYS. Pesman, M. Walter. 278 pages, illustrated, bibliography, indexed. Dale S. King, Globe, Arizona. 1962. Cloth, $6.00; Spiral, $5.00; Paper, $4.00.

Mr. Pesman, author of *Meet the Natives* [of the Rocky Mountains], has turned to a warmer clime and now presents a much-needed plant guide for the layman tourist in Mexico. He has amassed a phenomenal amount of information about the plants that he has observed, collected, and drawn, such as numerous vernacular English and Spanish names, economic uses, flowering dates, ecological groups.

NEW ZEALAND NATIVE PLANT STUDIES, 2nd ed. Davies, William C. 333 pages, illustrated, maps, bibliography, indexed. Heinman, New York. 1962. $15.00.

Originally published in 1956, the first edition of this magnificently illustrated work was quickly exhausted. This second edition has been revised with recent changes in nomenclature incorporated. The descriptive text that accompanies each of the 139 plates includes vernacular names and flowering dates.

THE PROGRESSIVE FARMER'S GARDEN BOOK FOR THE SOUTH. Blackwell, Cecil and L. A. Niven. 188 pages, illustrated (part colored). The Progressive Farmer Co., Brimingham, Ala. 1962. Paper, $1.25.

This booklet, the product of many heads, has been written by two men with rich backgrounds of horticultural extension work in the South. Its contents are primarily devoted to the growing of vegetables and small fruits. In a section of thirty-eight pages are planting tabulations for each of the sixteen southern states under such headings as "Recommended Varieties," "Days to Maturity," "Seeds and Yield per 100-foot Row," "Fertilizer Rate," and much more pertinent data. An essential manual for southern gardeners.

THE ZEN GARDENS. Okomoto, Toyo and Gisei Takakuwa. various paging, illustrated. Perkins Oriental Books, New York. 1962. Paper, $6.50.

An attractive album of ninety-nine photographs, with brief descriptions, depicting characterstic features of fifteen of the famous Zen gardens in Kyoto, most of which are open to the public. These include the Moss Temple, the Tenryu-ji, the Golden and Silver Pavilions, the Ryoan-ji, the Tofuku-ji, some subsidiary temples of the Myoshin-ji and others.

MISCELLANEOUS

PUNCH-CARD METHODS IN RESEARCH AND DOCUMENTATION: WITH SPECIAL REFERENCE TO BIOLOGY. Scheele, Martin. 274 pages, illustrated, bibliography, indexed. John Wiley and Sons, (Interscience Div.), New York. 1962. $9.50.

This first English edition, based on the second revised German edition (1959), is divided into three parts—1) an explanatory survey of present and past methods; 2) general rules for application in research and documentation; 3) practical "case history" examples in detail of punch-card methods with specific biological subjects. Unfortunately, the references and discussions in the field of botany are few and brief.

YOUNGER READERS

AIR. Adler, Irving and Ruth. 48 pages, illustrated (part colored). (The Reason Why Series) John Day Co., New York. 1962. $2.00.

A clearly written account of air, its composition, uses, and importance to plants and animals, with excellent, simple diagrams and figures. For grade-school readers.

BIOLOGY FOR CHILDREN. Hanauer, Ethel. 96 pages, illustrated, indexed. Sterling Publishing Co., New York. 1962. $2.95.

Elementary biology projects for the ten-year-old group, presented by an experienced biology teacher whose slogan is "Doing rather than watching leads to scientific know-how." A large section is devoted to experiments with plants.

ELIZABITE: ADVENTURES OF A CARNIVOROUS PLANT. Rey, H. A. unpaged, colored illustrations. Harper and Row, New York. 1962. $2.75.

The hilarious escapades of Elizabite, the mean-tempered animal-eating plant, first described and pictured some twenty years ago, are now back-in-print. H. A. Ray, with his tongue in his cheek and his brush and pen in his hand, created this picture-story book for those of very tender years, but I believe that some oldsters will chuckle when they read it to their grandchildren.

FOREST GIANTS: THE STORY OF THE CALIFORNIA REDWOODS. Huntington, Harriet E. 57 pages, illustrated. Doubleday and Co., Garden City, N. Y. 1962. $2.50.

Two dozen striking photographs of the California redwoods (the giant sequoia, also called big tree and Sierra redwood, and the Coast redwood), with easy-to-read facts and figures accompanying each picture. A most attractive and informative book for youngsters.

THE GOLDEN SEED. Konopnicka, Maria. 44 pages, colored illustrations. Charles Scribner's Sons, New York. 1962. $3.50.

A Polish folktale, adapted by Catharine Fournier for little children, about the golden flax seed that furnished linen cloth for the king and his people. Janina Domanska's drawings of medieval life are very clever.

HOW PLANTS GROW. Neurath, Marie. 36 pages, illustrated (part colored). (Full Color Nature Series) Sterling Publishing Co., New York. 1962. $2.50.

Simple facts and stories cleverly illustrated.

JUNIOR SCIENCE BOOK OF TREES. Lemmon, Robert S. 63 pages, colored illustrations, indexed. (Junior Science Books) Grosset and Dunlap, New York. 1962. $1.00.

A most attractive book, with good illustrations, on the growth and structure of trees, written accurately but simply for "primary graders" by a well-known author of nature titles.

MY FLOWER BOOK. Landis, Dorothy T. 20 pages, colored illustrations. Rand McNally and Co., Chicago. 1962. $1.00.

A most delightful flower-picture book, with a two-line rhyme for each flower, for those under six.

OUR TINY SERVANTS; MOLDS AND YEASTS. Kohn, Bernice. 62 pages, illustrated, indexed. Prentice-Hall, Englewood Cliffs, N. J., 1962. $2.95.

What are the nasty little black spots on a damp towel, the soft greenish blue fuzz on an orange, the black whiskers on a piece of stale bread? The answers are to be found in this fascinating book for young boys and girls, and simple experiments are described which any child can try at home.

THE PICTURE BOOK OF GRAINS. Brooks, Anita. 96 pages, illustrated, indexed. (Picture Aids to World Geography) John Day Co., New York. 1962. $3.00.

"Grain is still man's important food," so ends this well-illustrated story of wheat, rye, oats, barley, rice, wild rice, maize (corn), millet, and doura.

PLANTS THAT MOVE. Selsam, Millicent E. 127 pages, illustrated. William Morrow and Co., New York. 1962. $2.75.

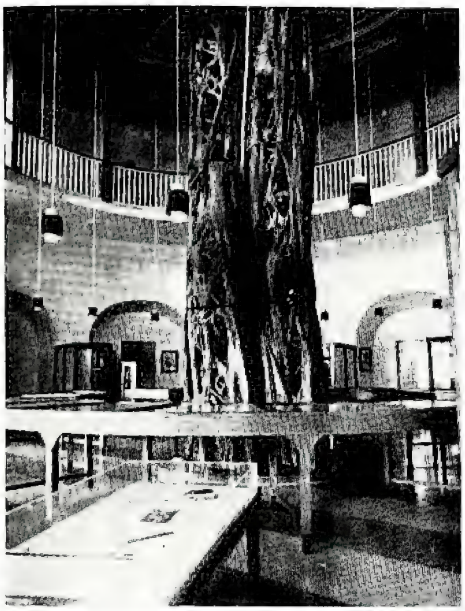
Millicent Selsam's books have an enthusiastic following among young people. The worn copies of her numerous titles that are in our Library bear witness to their popularity. *Plants That Move* was originally published as two separate volumes, *Play With Leaves and Flowers* and *Play with Vines*.

THE TRUE BOOK OF CHEMISTRY: WHAT THINGS ARE MADE OF. Carona, Philip. 47 pages, illustrated. (True Book Series) Children's Press, Chicago. $2.00.

Another welcome addition to the True Book series which is prepared for primary-grade readers under the able direction of Illa Podendorf of the Laboratory School, University of Chicago.

YOUNG PEOPLE'S SCIENCE ENCYCLOPEDIA, edited by the Staff of National College of Education, Evanston, Ill. 20 volumes. Illustrated (part colored), bibliography, indexed. Children's Press, Chicago. 1962. $44.95.

An up-to-date, profusely illustrated comprehensive work for children of the third through the ninth-grade level. Embraces a wide scope including botany, zoology, mineralogy, physics, chemistry, geology, astronomy, climatology, and agriculture. Besides descriptive articles there are



This fig, one of the permanent exhibits in the Hamburg Institute for Applied Botany, was imported by merchants from Africa during the nineteenth cenutry.

clear directions for several hundred experiments which can be carried out at home or in school. Volume 20 contains a guide for parents and teachers, and numerous lists of projects and reading suggestions.

YOUNG AUDUBON, BOY NATURALIST. Mason, Miriam E. 198 pages, illustrated. (The childhood of Famous Americans Series) The Bobbs-Merrill Co., Indianapolis. 1962. $2.25. Another title in this grand series which presents so vividly the lives of historical personages.

LETTERS TO THE EDITOR

The following letter was addressed to Ernesta Drinker Ballard, in care of *The Garden Journal*, and is published here with her, and Sue Zaki's permission.

I read with great interest your article "Some Thoughts on Growing Plants Indoors" in *The Garden Journal*. I get it [the publication] a year later from a friend living in the States, but have been so fortunate to receive the March-April [issue] already this year. I do not know if she meant me to have it, or if it came by chance!

Incidentally, I noticed your book title *Garden in Your House*, and spent twenty days running to all book shops in Cairo. Regretfully, I failed to locate it within a year. Bookshops sell what they have, accepting no individual orders because of the difficulty of sending money abroad, subject to certain long formalities. I read it [the title] again in your article and am disappointed at not being fortunate to obtain the book.

I am Egyptian, nineteen [years] of age, in college. Very keen amateur of indoor gardening and living with a fine collection of plants in my apartment in Cairo, facing the Nile-Hilton International Hotel, with the American Embassy five minutes away.

It is my belief, too, that environment plays a great role in plant life. I worked out a plan for growing plants said to be devoted to warm glass houses, but they died; while the same plants lived in my apartment at room temperature!

I asked Miss Elizabeth Hall, the Librarian at The New York Botanical Garden, to oblige me with a dollar copy of *Handbook on Bonsai*. [*Handbook of Bonsai*, Brooklyn Botanic Garden publication, is now on its way to Miss Zaki as also a copy of Mrs. Ballard's book *Garden in Your House*].

Since I prepared the article on the "International Horticultural Exposition in Hamburg," for the January-February, 1963, issue of *The Garden Journal*, I have obtained some further information which may interest the readers.

There will be a special exhibit on "Industry and Horticulture," in which will be shown everything useful for gardening: complete greenhouses, heating systems, irrigation systems, electrical machines, bulldozers, insecticides, fungicides, fertilizers, garden furniture, fountain pools, tools, and so on. Two of the greenhouses on display will be planted with house plants, one with carnations, one with chrysanthemums, one with cucumbers, one with tomatoes, and one will demonstrate raising plants from cuttings in the most modern method. The chrysanthemum house will be equipped with intermittent lighting.

A special show on "Applied Botany" is being arranged by the State Institute for Applied Botany on the exhibition grounds through the generosity and cooperation of the City of Hamburg.

During the past one hundred years, the Institute has acquired a collection of twenty-seven hundred varieties of seeds and fruits and a famous collection of seaweeds. Not only the plants, but their products will be shown—coffee, tea, cotton, fruits of exotic plants, opium, to mention only a few. Also on display will be a manuscript from Ceylon written on the leaves of a palm tree.

One of the curiosities of the Institute is the climbing fig that merchants imported to Hamburg from South Africa during the last century. The growth indicates that the fig had climbed around three trees which naturally died, though the fig stayed alive.

The Institute maintains a laboratory for market research—this was started in 1887.

The party on the tour of European gardens, arranged by the American Horticultural Society, will be here for the opening of the International Horticultural Exposition on April 30, 1963. Dr. Heinrich Luebcke, President of Germany, will officiate at the inaugural ceremonies.

I am spending the winter abroad in Germany and Switzerland.

BEATE HAHN

BOOK SERVICE

Books reviewed in the pages of *The Garden Journal*, or any book on botany, gardening, flower arrangement, natural science, or kindred subjects may be ordered through Book Service.

Members are entitled to a ten per cent discount on the list price. Please send check or money order payable to The New York Botanical Garden with your order.

MEMBERSHIP

We were delighted to welcome the following new members between December 1, 1962, and January 31, 1963.

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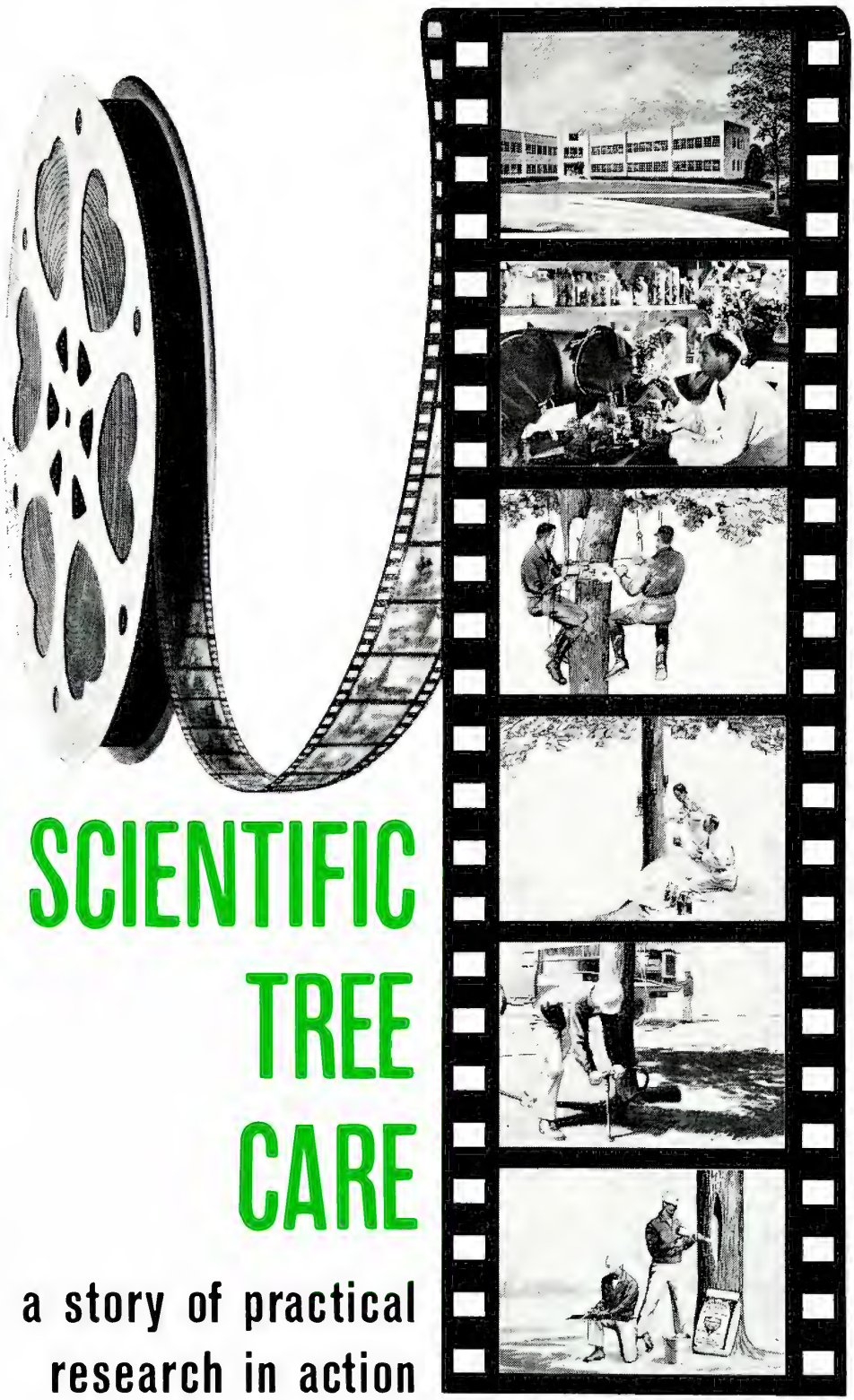

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An Invitation to

ROSE DAY

June 8, 1963

The New York Botanical Garden cordially invites all who are interested in roses to its twenty-first annual Rose Day.

The theme, "Roses, a Pleasure and Not a Chore," will be directed to the home gardener in the greater metropolitan area of New York, New Jersey, and Connecticut.

The program will include practical "how-to" demonstrations, talks on rose gardening and the careful use of insecticides, films on roses and famous rose gardens, question and answer sessions, and exhibits of prize-winning blooms.

A high point of the day will be the visit to the Rose Garden in which seven thousand rose bushes in nearly four hundred varieties furnish a colorful display.

The day's events will begin at ten o'clock in the morning and will conclude about four o'clock in the afternoon. Registration will be from 9:45-10:00 A.M.

THE GARDEN JOURNAL

DOROTHY EBEL HANSELL
Editor

Calendar

May 6, 1963. Annual Meeting of The New York Botanical Garden.

May 7 and May 14, 1963. Annual Showing of gardens and penthouse terraces, sponsored by City Gardens Club of New York City.

May 9 11, 1963, noon 9 p.m. The Arts and Flower Show, Martin's Community Hall, Huntington, N. Y., for the benefit of Huntington Symphony Orchestra.

May 16, 1963. Spring Garden Tour to North Shore, Long Island, sponsored by the Volunteer Associates of The New York Botanical Garden.

May 16, 1963. House and Garden Tour in Westchester County, N. Y. and Greenwich, Conn., for the benefit of the Institute of Physical Medicine and Rehabilitation, New York University Medical Center.

May 26, 1963, 2 - 5 p.m. Garden State Iris Society Show, Fairleigh Dickinson University, Madison, N. J.

June 1 - November 15, 1963. Exhibition of botanical works of Mary Gibson Henry, Museum and Administration Building of The New York Botanical Garden.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

June 19, 1963. Reception for graduates of The Two-Year Courses in Botany and Gardening at The New York Botanical Garden.

October 3 - 12, 1963. Fourth World Orchid Conference, Singapore.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

November 9 - 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration—touring the Garden in the "Floral Flyer"—photographed by Walter Singer; contents page, Walter Singer; pp. 79, 80, 82, F. A. Stafleu; pp. 84-87, Gottscho-Schleisner; p. 88, Lockwood, Kessler & Bartlett, Inc.; pp. 89-91, Long Island State Park Commission; pp. 94-96, Charles C. Clare, Jr.; pp. 98-100, Alice Dustan Kollar; pp. 102, 105, 107, 113, 116, upper right 117, Walter Singer; pp. 109-111, Jennie L. S. Simpson; p. 117, upper left, Gottscho-Schleisner.

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THE TULIP AND THE NETHERLANDS

By F. A. STAFLEU*

Botanical Museum, Utrecht, Netherlands

THE TULIP has played an important rôle in Dutch horticulture almost since the beginning of its introduction in western Europe. This rôle has been a different one in different times. It is a far cry from the growing of single specimens at fancy prices in the early days of the seventeenth century to the mass production of tulips now in the bulb fields of Holland, just as there is a wide gap between the use made by an unenlightened Antwerp merchant in the sixteenth century who received a quantity of bulbs from Turkey and found them definitely inferior to onions, and the distaste with which many Dutchmen turned to eating tulip bulbs in the winter of 1944-1945.

The introduction of the tulip in western Europe in the course of the sixteenth century is not something which came about by pure chance. Feudal Europe and medieval man were barely interested in flowers for their own sake or for the sake of beauty, and what, after all, is interest in flowers for the sake of beauty but horticulture, and what else but botany is interest in flowers for their own sake? Horticulture and botany in the modern sense of the words hardly existed in medieval times. Plants were grown for ornamental purposes mainly in the gardens of castles and the cloisters; medieval rose gardens are often mentioned in literature and can be seen on a number of paintings. Mostly, however, plants were grown in gardens as herbs or for medicinal purposes, in a purely pragmatic way.

The number of plants grown in European gardens had remained constant for ages. The gardens contained mainly plants from southern and middle Europe with some plants of Asiatic origin, already introduced in classical times. Fragrant herbs and shrubs (roses!) were common. There were some daisies, lilies, periwinkles, aquilegias, peonies, carnations, iris, and violets, but of only a few of these species can one say that horticultural improvement had started, and we should realize that they were always grown as individual plants, never in massive groups for display. There were hardly any hyacinths, daffodils, and snowdrops, and there were no lilacs, crocuses, (except, of course, for the true saffron), tulips, anemones. The Dutch historian of horticulture, W. Van Dijk (1951), estimates the number of species generally grown in gardens at the beginning of the sixteenth century at about ninety. There were at least three hundred species in common cultivation by the end of the century. It was the renaissance that liberated and developed the culture of the individual mind and that brought about an open-minded attitude towards other human beings, and towards animals and plants.

The sixteenth century, therefore, saw at last the great development of gardens in western Europe purely for ornamental purposes and the beginning of interest in plant species as objects of interest by themselves. This new attitude stimulated the introduction into western Europe of new and unknown plants from foreign countries. Carolus Clusius (1526-1609) and his contemporaries began to write botanical books for the sake of knowledge and love of the plants themselves and not for their medical uses. The spectacular entry of the tulip into western European gardens must be seen against this receptive spirit of the sixteenth century, receptive both from a botanical and from a horticultural point of view.

The pre-sixteenth-century botanical or medico-botanical literature does not mention the tulip. None of the classical books mentions anything which can be taken for a tulip. The introduction of the tulip in the sixteenth century resulted from the very close political and economic relations that developed in those times between Turkey, the Ottoman Empire, on the one hand, and Austria, the Austrian Empire, on the other. In the middle of this century the Ottoman Empire reached the peak of its economic and political growth. Turkey was one of the world-powers of the time. Moreover, it was a non-Christian, an Islamic nation, and very aggressively so. The Turkish menace hung heavily over western Europe, and the major European opponent of Turkey was the enormous Austrian Empire. There were frequent wars, and the Austrian power-line moved over the Balkan Peninsula and the Danubian countries with the issues of those wars. But there was not always war: there were also times of peaceful coexistence in which intense and close economic and diplomatic contacts were maintained between the two powers. We have to thank those economic and diplomatic contacts between Austria and Turkey for the introduction of the tulip into western Europe.

In the year 1554 Ogier Ghislain de Busbecq (1522-1592), a Flemish nobleman who was Austrian ambassador to Suleiman I, "the Magnificent" (1494-1566), observed while traveling from Adrianople to Constantinople an abundance of flowers in the early spring when he still expected to see the dead landscape of winter. He mentions narcissus and hyacinths, and flowers which, he said, were called *"tulipam"* by the Turks, and he comments on the great variety and the beauty of the colors of these flowers. The origin of the word tulip is still shrouded in mystery, because the Turkish and Persian word for the flower is *lale,* and it is supposed by some that de Busbecq misunderstood his local servants or his interpreter who may have compared the shape of the flower to that of a turban or *dulban.*

De Busbecq sent bulbs and seeds to Vienna, or perhaps he brought them there himself. It is not necessary to follow in detail the introduction: in the middle of the century and especially in the 1560's we come across several references to the tulip in contemporary literature. The Antwerp merchant who received this shipment of unknown bulbs from Turkey in 1562 has already been mentioned. (The Netherlands were part of the Austrian Empire at that time.) He

threw away the lot which he had not tried to consume, and some of them produced flowers next spring: this is why it is known what the man had in hand.

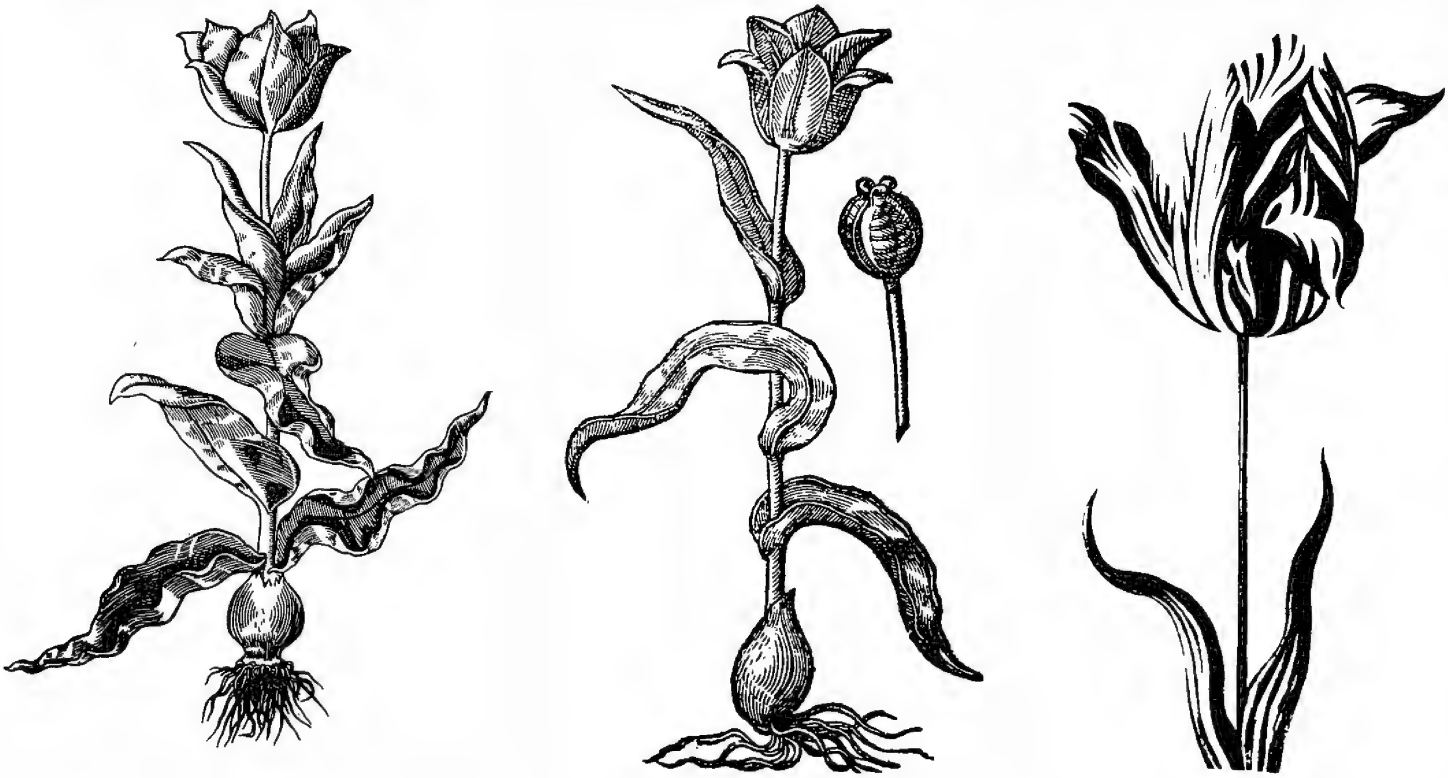
In 1561 Konrad Gesner (1516-1565) was the first to describe and figure the tulip in a botanical publication; other figures are given by Pierandrea Mattioli (1500-1577) in 1565 in the Latin edition of his commentaries on Dioscorides and by Carolus Clusius in 1576.

The tulip was not the only horticultural plant of major importance brought to western Europe from the Near East in the later part of the sixteenth century. The growing interest in plants as such and as objects of beauty resulted in a kind of horticultural explosion, of which the many colored tulips were part, but of which other examples are the yellow crocus, the tall bearded irises, the lilacs, the horse-chestnut.

From the fact that the tulip in its countries of origin, Turkey and Persia, already showed such great variety in the sixteenth century, we may conclude that it had been in cultivation for some time and that considerable hybridization had taken place. It is impossible now to trace the ancestors of our common tulips; in the sixteenth century these ancestors must already have become obscure. Almost all our common garden tulips belong to the *Tulipa gesneriana* group, and in sixteenth-century Turkey these tulips showed practically every characteristic with which we are now familiar, except the so-called parrot form (tulips with laciniate petals). This group is distinguished by having varieties with both yellow and white grounds, a characteristic not possessed by any other true tulip species (see Hall 1940). This seems to suggest a hybrid origin with a white-ground and a yellow-ground parent. No wild parent with a white ground, however, is known to exist. Furthermore, all the varieties are fully interfertile (although sometimes self-sterile) and at present no hybrid origin is assumed. Hall's hypothesis is "that a mutation from a yellow ground to a white ground arose in a cultivated specimen of some original Gesnerian species and this by cross-breeding with the type gave rise to the cultivated race." This remained ever varying, and it has become impossible to pick up the primitive type among the many semiwild forms. Probably the primitive type was a yellow-ground crimson tulip with a black blotch margined with yellow. The yellow ground is a simple Mendelian character, recessive to white. This yellow or white color is due to the plastids of the mesophyll. The variety in colors of the tulip is caused by the occasional presence of crimson or purple anthocyanins in the cells of the epidermis. The ultimate color then depends on the shade of anthocyanin and the degree to which the ground color shines through. The Turks cultivated tulips widely and even had fancy names for them just as we have at present. 'Suleika's Dream' was one of them and 'Enhanced Joy' another. The Sultan had special tulip gardens in which many varieties were maintained.

In the meantime the Flemish-Austrian botanist Charles de l'Escluse, better known as Carolus Clusius, had taken an interest in the tulips, as well as in the many other plant introductions of his century. This first scientific horticulturist and plant taxonomist lived from 1526 to 1609; his life bridged the entire horticultural explosion that resulted from the Renaissance and from the increased wealth and interest of the well-to-do civilian and aristocratic classes. It was Clusius who published the first monograph of the tulip. During his stay in Vienna as prefect of the imperial garden

Left. One of the earliest illustrations of a tulip (reproduced by Hall, 1940, from Mattioli, 1565).
Center. The illustration of a tulip given by Carolus Clusius, 1576.
Right. 'Semper Augustus', one of the most famous broken tulips of the tulipomania (reproduced by Krelage, 1946, from a 1636 tulip-book).



Charles de l'Escluse or Carolus Clusius, 1526-1609.

he received seeds and bulbs from de Busbecq.

The tulip came to the Netherlands quite early, since it is mentioned in 1568 by the famous herbalist Rembertus Dodonaeus or Dodoens (1517-1585) and again by the herbalist Mathias de L'Obel (1538-1616) in 1581. Clusius, however, was the first to publish a more extensive account of the tulips known to him in an appendix to his Spanish Flora (1576). It is he who provides us with the anecdote of the Antwerp merchant. He mentions the early and late tulips, the colors yellow, red, white, and purple as well as the variegated early-flowering varieties. He published two amended editions of this monograph, in 1583 and 1601. In the meantime he had been appointed professor of botany at the newly founded University of Leiden, the first university to be established in the newly independent United Netherlands. Leiden had been chosen as the place for this university because of its heroic resistance against the Spanish troups in 1574, a victory which virtually consolidated the independence of the Netherlands. Clusius started a botanic garden at Leiden, and in it he grew many of his tulips. From this garden, but also from other independent introductions, came the material for the later bulb industry.

We may well wonder what these first tulips looked like. In general they were similar to what we now know as the dwarf scarlet Christmas tulip. This type of tulip was called "Duc" at the time, and the tulip described by Gesner looked very much like our present 'Duc van Tol', one of the earliest and smallest of garden tulips (excepting, of course, the modern *Tulipa kaufmanniana* and other "species tulips"). This is a dwarf tulip, its petals red with a yellow border. The origin of the word "Duc" (Duke) is not known, there may be some heraldic association, but at any rate the term "Duc" stood for a group of early dwarf single tulips. The words "van Tol" simply indicate the name of the originator. This particular van Tol was not a duke at all, he was a Leiden public notary and tulip fancier. In the beginning of the seventeenth century many wealthy people in Holland started growing tulips in their gardens and, otherwise from our present practice, they propagated the tulips not only in the vegetative way through bulbs, but they also went to considerable trouble to propagate them by seeds. True, the original introductions had been both through bulbs and seeds, and since the tulips as they grew in Turkey at that time were heavily heterozygous, and did not breed true to type, we can easily understand the great variety of forms which was so notable from the beginning. But somehow this propagation through seeds took place only incidentally, and it is an interesting phenomenon that the private tulip fanciers in the Netherlands started to do this themselves. Sometimes five to seven years elapse before seedling tulips come into flower: evidently people in those days were quite prepared to go in for a time-consuming and leisurely hobby.

The reason for the existence of many amateur tulip breeders in Holland again has a definite economic background. Since the establishment of Dutch independence in the last quarter of the sixteenth century, Dutch sea-power and consequently Dutch trade and industry had blossomed, creating a new class of well-to-do "burghers," wealthy merchants, in the western part of the country. The United States are experiencing now the famous phenomenon of the "second house"; but a similar development took place in Holland during that early booming prosperity. The region best suited for setting up these country houses, or rather country estates, of the new well-to-do but not aristocratic class was on the inland side of the dunes which stretch all along the coast. It is this region that, as we shall see, developed much later (in the nineteenth century) into the great bulb-growing district. At that time, however, the tulip fanciers of Amsterdam, Haarlem, and Leiden started their second houses and country gardens in exactly the right place from the horticultural point of view. The soil and climate were excellently suited, and it is therefore no miracle that the early seventeenth-century Dutch movement of the second house was also a major factor in creating the later bulb industry. Crispijn van de Passe the younger, in his *Hortus floridus* (1614), provides a picture of such an early seventeenth-century Dutch garden. The amateur growers did not grow their tulips for display in mass, for large-scale effects; they grew them for their beauty as individual flowers. This is the reason why there never existed more than a thousand, or perhaps even a hundred bulbs, of many of the most famous tulips from the time of the tulipomania.

The variety of forms and colors obtained was already very great and intriguing, but this variety was made even greater by a phenomenon which I have not yet mentioned but which became later, throughout the seventeenth and eighteenth centuries, the most important criterion in growing bulbs. I refer to the well-known "breaking" of tulips, the development of a single-colored or self-colored tulip into a variegated one with irregular flame-shaped streaks of white or yellow (the ground) in the original purple or red. From the beginning it was known that the bulbs brought

from Turkey all had this curious habit of breaking into variegated forms. The self-colored tulips were not held in high esteem; it was the "broken" or fine tulips the growers were after. We now know that broken tulips are diseased and harbor a virus which dissolves the pigment (anthocyanins) of some of the cells of the epidermis, thus permitting the white or yellow ground to shine through.

It was at the famous English John Innes Institute of Horticultural Science that the discovery was made that the breaking of tulips is due to a virus disease. A major rôle in this work was played by finding that aphids could cause self-colored tulips to break. This disease has been cultivated for three or four centuries without seriously affecting the tulip as such. A broken tulip is not constant in its degree of fineness; after several generations it becomes coarser and coarser, and it usually ends simply by dying, for all these virus-infected bulbs have lesser viability. The amateur bulb-growers, eager for these fine tulips, started experiments to break self-colored ones by infecting them by means of tying together a damaged self-colored bulb and one of the halves of a bulb of a broken tulip. Needless to say, nobody regarded this phenomenon as a disease: this practice of infecting healthy bulbs with diseased ones was purely based on experience.

The famous (or infamous) tulipomania reached its height between the years 1634 and 1637, but even before these years some bulbs fetched ridiculous prices. As early as 1623 a single bulb of 'Semper Augustus' was sold at $330. There was never a time at which there were more than twelve bulbs of this tulip. Still, tulips had not yet become objects of speculation: this occurred only in the 1630's. Before those years the tulips were in the hands of some professional growers and a great many enlightened amateurs of the well-to-do classes. I say on purpose *some professional* growers, for there was still little real trade in bulbs. We know only a few names of professional bulb-growers, for example, five in Haarlem in 1637. During the 1630's, however, this tulipomania swept over Holland, and the people most seriously involved in this seventeenth-century gold-rush were not the amateur growers or these few professional plantsmen, but mostly recent immigrants from Flanders (weavers) and, in general, simply small wage-earners, who knew nothing about tulips as such. The tulip had become an object of speculation, and it was not the tulips themselves people were after—they were only out for financial gain.

In this country of the gold-rushes I need not elaborate on the interesting pattern of such a social infectious disease. The tulipomania of the seventeenth century had all the characteristics. One might well ask how the strongly Calvinist and usually thrifty Dutch became the victim of such a worldly money-fever. When one knows more about this people, it becomes apparent that betting and speculation were and still are favorite sins of the Dutch. I have already mentioned the economic boom of the early seventeenth century, which ultimately gave rise to what we now call the golden age. There was a tremendous increase in wealth but only for the few. Contrary to the affluence of present-day society, the riches were concentrated in the hands of a numerically small but socially very important class of merchants and industrialists. Most of the rest of the people lived in poverty. Many people died of hunger in Holland, indeed throughout western Europe, in those affluent times. Furthermore, infectious diseases swept the country time and again, especially the plague; and its victims were seldom among the well-to-do, who lived sufficiently far away from the rats. The tremendous extremes of wealth stimulated gambling, betting, and speculation. Practically everything served for a wager: the issue of a battle in the war against the Spaniards, the fate of the crop in a rainy season, the success of an expedition to the East Indies. Why precisely around the year 1635 this speculation turned to bulbs is difficult to say, but at any rate the general economic background was favorable for it, morale had been loosened even more by a particularly heavy epidemic of plague in the years 1634 and 1635, and religious quarrels between opposing factions of the governing classes did nothing to restore confidence in the churches. In the season of 1635-1636 prices rose to extreme heights, and this was repeated in the next winter of 1636-1637. There was no time to grow new tulips, for this took several years. In all about five hundred varieties of tulips were involved in the tulipomania; four hundred and fifty pictures are known to exist. The speculation then had as its object the relatively small numbers of bulbs made available by the growers and the amateurs. Everybody started propagating tulips in his small back yard or city garden, and the results, as far as quality is concerned, can be imagined. The trade was carried on in taverns and followed strict rules, which are too intricate to be discussed here. One interesting parallel with the gold-rush is that during the height of the speculation the bulbs were sold per "aas," a unit equal to one-fifth gram used by the goldsmiths of the time. Tulip bulbs which had not yet been lifted changed owners many times, and the trade became typically a swindle when more bulbs were being sold or promised than were actually available in the country. Of the prices paid for one bulb some have become famous: one 'Semper Augustus' of 193 aas (about forty grams, or a little more than one ounce) was sold for $1200. cash, plus a new carriage with two dapple-gray horses to be delivered within four weeks. The $1200. was to be paid on the spot, but the bulb would be supplied later.

There are many stories of this kind, but only a few are really based on written legal contracts. The famous story of the 'Viceroy' bulb, which was sold for two loads of wheat, four fat oxen, eight fat pigs, and some twelve other huge quantities of food, is a fable based on a contemporary estimate of what one could buy for the price (in cash) which one bulb had fetched. Most sales were effected for cash, as one might expect in times of speculation, since this promotes a more rapid turnover of the money.

This stock-exchange speculation had all the familiar characteristics of gambling. Bulbs were offered for sale which remained in the hands of the grower or dealer, while they were nominally changing hands several times before delivery: planting time. Ultimately the dealer kept the bulb himself and reimbursed the latest owner if it had gone up in price, or was reimbursed himself if the price had gone down.

The crash came, inevitably, in the early spring of 1637: everyone wanted to sell and the market was flooded. Some unfortunate dealers went to the trouble to set up mock auc-

tions to keep up the prices, but they were of no avail. The government intervened and made special regulations nullifying all contracts and agreements made after a certain date. Most of the growers and speculators quickly cut their losses and accepted in ready money only a fraction of the fancy prices. The tulips reverted to the growers and the amateurs, and a great many people lost fortunes they had never really owned. This short inflation of the tulip did relatively little damage: the people who lost their fortunes were just as poor as before, and the growers and plantsmen found themselves again in the legal possession of their bulbs.

A flood of pamphlets accompanied the tulipomania, all in Dutch and difficult to translate. One result of lasting importance may be mentioned. The trading often took place on the basis of colored plates (mostly water colors of the tulips) of which many examples survive today. The plates were bound together in tulip-books which were, in fact, a kind of sales-catalogue. Some of these tulip-books are of great beauty and were made by some of the most outstanding painters of Holland. Needless to say, these tulip-books are now extremely rare. Quite a few of them are still in Holland, mainly because of the activities of Krelage who collected them before other amateurs came on the market.

The tulips of the tulipomania are all extinct. This is nothing remarkable: they were practically all "breaks" of fine tulips, that is diseased plants, and they were bound to disappear pretty soon. Some of the breeder tulips of the time are still extant: these were the self-colored tulips used to obtain new broken varieties.

The fancy names of the tulip varieties or cultivars have often been commented upon. I have already mentioned the "Dukes" which were a kind of tulips, a class of cultivars denoted by the term "Duc" followed by the name of the originator. These originators were anything but dukes: after all the Dutch had done away with their dukes in the revolution against Spain, so why revive them? There are, however, a great many tulips called either Admiral so-and-so or General something. This might lead one to the erroneous conclusion that the Dutch were very militaristic. They were not: the terms "Admiraal" and "Generaal" were used in the same way as "Duc," not, however, to indicate a certain kind, but to denote a certain degree of excellency. The best varieties from a certain group were called Admiraal so-and-so, the so-and-so being the originator.

The tulip trade before the tulipomania was of very small importance; this changed after the infatuation. The tulipomania was the best possible publicity campaign for the Dutch trade. If only it had been brought about on purpose, we would have been able to compare the authors of it with our best sales-managers and publicity agents of today. The tulipomania started an enormous interest in the tulip in western Europe. At balls, dances, and weddings at the French court, tulips were worn by the ladies as a status symbol. In fact, the bulb industry as such was born out of the tulipomania. Serious growing and propagation for the international trade were started in those days and have continued until the present time. True, tulips were not yet used in mass as they are now; they were still grown essentially for their qualities as individual flowers. The value was the greater because very little was known at the time about advancing the date of flowering, so that the season lasted only two months at most. The trade and industry concentrated upon growing these broken tulips until after the Napoleonic wars. Apart from Holland the tulip was grown commercially in Flanders and England during the seventeenth and eighteenth centuries. These centers produced mainly for the local markets but developed in much the same way as the Dutch, that of growing breeder tulips primarily for

The picture of a Dutch spring garden given by Crispijn van de Passe, the younger, in his *Hortus Floridus*, 1614.

the purpose of breaking them. The Flemish and northern French growers, however, concentrated more on round flowers with long thick stems, and also selected more broken tulips with a yellow ground *(bizarden),* whereas the Dutch growers specialized in square flowers on shorter stems and broken varieties on a white ground *(bijbloemen).* This divergence proved to be of considerable importance in the late nineteenth century. The eighteenth century was one of a relative decline of the tulip in Holland and of greater success for the hyacinth, but that is another story. There were still a number of wealthy amateurs who kept large private collections.

In the beginning of the nineteenth century horticultural ideas changed, and tulips were asked for to create designs in landscaping and gardening. This immediately favoured the propagation of the self-colored breeder tulips, which had hitherto been kept simply to provide fresh basic material for broken or fine tulips. From then on tulips were grown for their spectacular colors, as they are grown nowadays. This was also the actual beginning of the tulip-fields as we know them now. The breeding of fine tulips for a trade specializing in single, high-priced bulbs took place in relatively small gardens or fields, mainly around Haarlem, but the new demand for tulips in quantity gave birth to the famous tulip-fields. This development started in the 1830's two hundred years after the tulipomania. True, the variety was not very considerable as compared with the stupendous wealth of forms and colors with which we are confronted today. The professional bulb-growers started propagating tulips from seeds and collected as many varieties as possible. For this purpose they also used other collections of tulips which were still maintained by amateurs in England, Belgium, and Holland. The most spectacular advance made in the nineteenth century was no doubt the discovery of the Darwin tulips by the Haarlem firm of E. H. Krelage and Son. This firm bought an old collection of tulips somewhere near the French-Flemish town of Lille, which was going to be abandoned. This collection had been grown by one family for over a century and many of the varieties in it had resulted from sowing tulip seeds obtained without any definite and conscious program of cross-pollination. In that Lenglart-Tripier collection of three thousand different breeder tulips and eight hundred broken ones, J. H. Krelage (1824-1901) discovered what we now know as the Darwin tulips, the long-stemmed, late, large-flowered, single, self-colored tulips which are so well known. They were distinguished from other tulip varieties by their size, color, and gloss; and Krelage, with the good eye of the true breeder, immediately saw his chance and started large-scale propagation; he also restored the market for late-flowering tulips. The original Darwin tulips were, therefore, not the result of a direct breeding program; they were the result of selection from an existing great variety of forms obtained by continuous, unintentional, more or less natural cross-pollination, followed by propagation by seed: the same method by which the variety of forms first arose in Turkey and shortly after the introduction of tulips into western Europe. The Darwins were first exhibited in 1889 at Paris and soon became so popular that they provided a new stimulus for the whole industry. From these Darwins again broken, virus-diseased varieties were obtained in the Flemish collection and propagated as the new well-known Rembrandt tulips. Later, around 1900, the Darwins were crossed with dwarf single early Duc van Tol tulips and thus gave rise to the Mendel tulips. These Mendel tulips, therefore, were the first tulips obtained by a planned program of cross-pollination.

I should mention also the Cottage tulips, a group of late-flowering tulips obtained from numerous varieties collected by English growers in old cottage gardens. These Cottage tulips (themselves late) were also crossed with single early varieties and gave birth to some of the Triumph tulips. Other Triumph tulips have Darwins as ancestors.

At the end of the nineteenth century there was a group of early tulips (Duc van Tol dwarfs, single and double earlies) and a group of late tulips (the old breeder tulips, the broken tulips, the selections called Darwin and Cottage tulips). As a first result of intentional cross-breeding the Mendel and Triumph tulips arose. The beginning of the twentieth century therefore witnessed a spectacular increase in the number of varieties, mainly as a result of careful selection and breeding programs. The tulip had already been in general cultivation for three hundred years, but even after such a time it was still possible to provoke a radical revolution in the industry by modern methods. However, the improvement of the old *Tulipa gesneriana,* the garden tulip complex, was not all. The times were ripe for even further spectacular advances.

The last important step in the development of tulip breeding was taken by the Haarlem firm of C. G. van Tubergen Jr., whose director J. M. C. Hoog (1865-1950), sent out plant collectors (P. Sintenis, P. L. Graeber, A. Kronenburg, J. Haberhauer) to Turkey, Armenia, the Caucasus, and Turkestan to collect wild species of *Tulipa.* The result has been stunning, although it took some forty years before the effects of this far-sighted program became of importance for the market. We all know the splendid 'Red Emperor', which is a selected strain from *Tulipa fosteriana* collected for Hoog by Haberhauer in 1904 in Samarkand and described and named by him in the appropriate botanical way. This 'Red Emperor' variety was received only once from the wild, in the first Turkestan collection by Haberhauer. All plants in cultivation go back to a single bulb: it is a clonal selection. *Tulipa fosteriana* has been used in breeding programs to improve the Darwin tulips, and many cultivars are now on the market which have *T. fosteriana* blood in them.

Other wild species also proved to be a great horticultural success; *Tulipa kaufmanniana, T. greigii,* and *T. eichleri* are well known. *Tulipa kaufmanniana* is known as the water-lily tulip; one of the most promising developments in the bulb industry today is the extremely early time of flowering and the absolutely new array of colors and forms obtained by crossing it with other species of *Tulipa.* At present there are some four thousand cultivars of tulips listed in the official international register (there were 1,323 in an eighteenth-century Turkish register!)

The story of the tulip, of which I have given a very short outline, is as fascinating as the plant itself. There are few plants of horticultural importance whose history is so closely linked with that of western Europe and of Holland.

(Continued on page 108)

MY GARDEN IN MIDSUMMER

By HELEN M. FOX

Helen M. (Mrs. Mortimer J.) Fox has contributed articles on gardening to a number of publications and is the author of several books. Her latest, *André Le Nôtre,* published by Crown Publishers Inc., in December, 1962, was reviewed in *The Garden Journal,* January-February, 1963. Mrs. Fox is a member of The New York Botanical Garden and its Advisory Council, and a member of the New York Unit of the Herb Society of America, the North American Lily Society, the American Rock Garden Society, the Horticultural Society of New York, and other horticultural organizations.

TRADITION HAS IT that more flowers bloom in spring than during any other time of the year. My garden, however, is at its height of color and fragrance during midsummer, that is from early July into September.

The lilies are the stars. There will be many kinds of *Lilium regale,* also western American, and such native eastern species as *L. canadense* and *L. superbum;* these will be followed by *L. speciosum* and *L. henryi* and their varieties, and for a while by the auratums which dim all other plants by their shining loveliness. To keep them company are the violet-blue campanulas. I shall not linger on these flowers in this article, nor shall I describe annuals, day-lilies, or dahlias, but shall dwell on less frequently planted summer beauties. Annuals take up a good deal of space, so I grow only a few in a season; but each year I choose members of a different group and thus have run through many of the wildlings from California and South America.

Herbs, to be sure, are always with me. The culinary and

Midsummer at "High and Low," the author's garden in Westchester County, New York.

medicinal plants are grown in the vegetable garden where they are conveniently snipped for flavoring and cut for drying, without causing a blank space in the garden proper. Many of their relatives are grown in the flower borders—the alliums related to chives, the artemisias related to wormwood and tarragon, and some of the relatives of *Thymus vulgaris* and *Satureia hortensis,* as also handsome nepetas botanically close to the modest catnip. Each of these members of a family has a similar habit of growth so that clusters of them in the planting bring unity to the garden picture. Moreover, with the exception of lilies, hollyhocks, and foxgloves, most midsummer bloomers do not form candle-like flowers, atop tall stalks, but carry their blooms, as do nepetas and platycodons, in branched umbels or cymes. Typical is pot-marjoram *(Origanum vulgare)* which scatters pink or white blobs of color through the planting.

In the borders are plants with cool gray foliage, such as the artemisias, whose bloom with few exceptions is inconspicuous. Among them is southernwood *(Artemisia abrotanum),* its stems clothed with leaves resembling starched threads arranged in clusters of uneven lengths. The whole plant of common wormwood or absinth *(A. absinthium)* is velvety gray. Its leaves with three to five lobes measure two or more inches in length. By midsummer the stems bend and look untidy; but after they have been cut back, they make a second growth and stand up straight again. Other artemisias attractive for their grayness in midsummer are *A. schmidtiana nana* with threadlike leaves divided into three segments. They provide a low feathery note at the front border after the tall flowering stalks have been cut back. *A. filifolia,* often called silvery wormwood, is a midwestern subshrub with pale green, narrow, cylindrical, hairy leaves, either entire or divided into three. The filminess of the leaves is emphasized when the plant is alongside a strongly green plant, such as the bushy pycnanthemum or mountain-mint which, by the way, smells of pennyroyal. I once went to great trouble to locate a species of this genus, only to find it growing wild on my hillside.

The borders of the herb garden are edged principally with *Lavandula officinalis compacta,* which has a tinge of violet in its gray leaves. This species brings the garden to its peak of loveliness when its flowers in dainty colors open in late June. The flowers are either dark or light violet; but occasionally there is a delicate white form and also a form with pink flowers, which is the most fragrant for me. Except in a few temperamental winters, this lavender has proved hardy in my Westchester County garden.

Another attractive border plant is *Teucrium chamaedrys* var. *glabratum,* commonly called germander. It has woody stems and is a procumbent shrub to one foot high. A dwarf form is not over six inches high. The leaves are dentate, glossy, and turn red at the tips; the two-lipped flowers may be rose-pink or reddish purple.

In midsummer two plants bear blooms noteworthy for delightful fragrance, so potent that it rises above the fragrance of lilies, thyme, sages, and wormwoods. The first is the common valerian or garden heliotrope *(Valeriana officinalis).* Its five-foot-high stalks carry pinnately divided leaves and cymes of gray-pink flowers. I have garden heliotrope at the back of the border, because its fragrance and

Right. Cardinal flower, *Lobelia cardinalis.*

Below. False dragonhead, *Physostegia virginiana.*

not its appearance provides the attraction. The other very fragrant plant is lady's bedstraw *(Galium verum)* with smooth stems three feet or so long sprawling over the ground. The flowers borne at the upper part of the stems form frothy yellow panicles. Galium should preferably be planted on a slope where weeds, which invariably find a home among its decumbent stems, can be more easily eradicated.

In June the banks behind my herb borders are gay with carnations. After these fade, the alliums gradually take over. They make no showing in spring, but by midsummer the plantings on the two slopes are fluffy and feathery with their blooms. *Allium ramosum* and *A. tuberosum,* both blooming from August into September, are similar. *A. ramosum* was formerly known under the name of *A. odorum.* Its greenish white flowers, unless they are bruised, have a pleasant hawthorne scent, with a slight trace of bitter almonds, and not the odor of onions. *A. tuberosum* has greenish lavender flowers with a faint green or brownish midline on the back. (This is cultivated as a pot-herb and salad crop in the Orient, the Asiatic counterpart of chives, *A. schoenoprasum.*) In mid-July comes *A. cyaneum* from the Altai Mountain. The whole plant, not over eight inches high, is gray-violet. *A. tanguticum* has pale opalescent flowers in late August. The spherical heads of *A. senescens,* with a diameter of two and a half inches, vary in color from rose to mauve-pink to brownish lavender. These blend well in July with the yellow flowers of *A. flavum,* carried on scapes two feet high, and characterized by two spidery bracts at fantastic angles under the flower-umbel. *A. flavum* is followed by *A. pulchellum* with glaucous violet scapes and flower-heads very like those of *A. flavum* except for the reddish lavender color. The American alliums, with the exception of *A.*

Above. Hostas flourish in semishade.

Lower Left.
Dwarf house-chestnut, *Aesculus hippocastanum pumila.*

Lower Right. Chaste-tree, *Vitex agnus-castus.*

cernuum, flower in spring. This species produces belllike flowers of a violet-tinted rose in graceful nodding umbels in September. The umbels later straighten up.

Midsummer is the time of *Phlox paniculata,* perhaps the most frequently met of all summer perennials. It can rise to four feet or higher. As almost everyone knows, the flowers range in color from white through all tints and shades of pink to reds and purples, and have an eye usually in a conspicuous contrasting color. To me the scent of phlox is pleasant, but many garden writers do not agree. The flowers should be cut off as soon as they fade, for phlox self-sows and the offspring often produce inferior-colored, such as the disliked magenta-colored, blooms. At the feet of predominantly pink phlox, *Stokesia laevis* is becoming. It has stems to two feet high, often floccose (woolly); oblong-lanceolate leaves, acute and spiney-toothed near the base; and lilac-blue flowers, three to four inches across, very like glorified thistles, which they truly are. Behind the phlox and in contrast to its bright colors could be *Artemisia lactiflora,* a green-leaved member of the family whose wide spires of creamy blooms rise to four feet. And there could also be a few plants of hollyhock, *Althaea rosea.* The double form, which has flowers like frilled paper roses, is particularly attractive. If the stem is cut back when it reaches two feet in height, the plant will grow several stalks and be bushy instead of resembling an exclamation point—so high it is difficult to keep upright.

From the end of June into September my garden seems to be predominantly violet-blue and lavender, with dashes of pink and red, set off against the grays of my foliage. Because of the fluffy character of the blooms and the fullness of the foliage, there are no vacant spaces between the plants.

The globe thistle *(Echinops exaltatus)* with grayish stems to four feet high bearing blue-gray, thistle-like flowers and spiney leaves, contributes to this color scheme. A few clumps of *Platycodon grandiflorum* from eastern Asia and related to campanulas are also appropriate. The usual color of the saucer-shaped blooms is a blue-purple, but there are also forms with pale blue or white, single or double flowers, and there is a handsome variety with pale pink, double blooms. Alas! it seems to be delicate. The flowers should be cut off as soon as they fade, before they turn brown and give an appearance of iminent disaster to the planting.

There are several medium-tall, bushy nepetas, which grow eighteen inches or more high, the plant spreading three feet over the ground. Among them are *Nepeta violacea* and *N. grandiflora.* When in flower the stems bend over, so the plants have to be staked. If they are cut back after blooming, the plants will flower again. The inflorescence is a long raceme, with the individual flowers, one-half to three-eights of an inch across, in whorls. They smell of nepeta but pleasantly.

Bringing roseate colors to the borders are the beebalms. Their ragged, round flower-clusters come in pale and deep lilac, pale or deep pink, occasionally white and, handsomest of all, a brilliant scarlet. This form grows wild in the shade of the margins of woods. I have acquired the different color forms over the years, some of them coming from seeds imported long ago from Switzerland from the elder Monsieur Correvon. The beebalms are among the many wild flowers which grow in meadows and along roadsides. They produce their flowers in midsummer.

Butterfly-weed or orange milkweed, *Asclepias tuberosa.*

In Europe many of these wild flowers have been moved to the garden, notably goldenrod. However, here in this country where they are at home some of the goldenrods, as also asclepias and the late-blooming asters, soon become too rampant when moved into a cultivated area. *Asclepias tuberosa* has not germinated for me; but when the cornucopias of cottony seeds are left to mature in the wild, they come up readily. They are so handsome and so attractive with their attendant crowd of monarch butterflies that they are left where they come up, unless it is in a spot unbecoming to the garden picture—next to a pink mallow or a rose. Another wildling (a native of Europe, naturalized in the United States) which is at home in my garden is *Malva alcea.* The pink or white cup-shaped flowers, with pistil and stamens cohered in a tube, are so fragile and dainty they look like carved jade or ivory.

Purple loosestrife *(Lythrum salicaria* var. *roseum)* is a sturdy, very leafy plant three to four feet high, with opposite entire leaves on many branches, each tipped by a spike-like inflorescence of rose-colored flowers with five petals. In the species, the flowers are deep rose-purple. Unfortunately, loosestrife spreads rapidly in the garden, but it can be thinned from time to time. It is said to like being near water—it does need moist soil—and I find it must have a sunny exposure.

I first saw *Epilobium angustifolium* in a garden border at Bagatelle in Paris. I had previously known it as fireweed in the Adirondack Mountains and had seen it coming up amid burnt stumps after forest fires. It is tall, and its straight stems are topped with delicately appearing, thin-textured, lavender flowers.

Physostegia virginiana, a member of the *Labiatae,* grows about three feet high. A six-inch spire of pink flowers, each about one inch long, tops each of its square branches. When the stem is bent, each branch grows up perpendicular to the ground. The leaves are sharply toothed. *Alba* is a form with white flowers, and there is also a low form called *nana* and other variations. The plant grows well in semishade and increases very much from its roots—in fact, is a rapid spreader. Beside a little pond in the woods, I have planted the

(Continued on page 97)

BAYARD CUTTING ARBORETUM

Information and photographs furnished by the Long Island State Park Commission.

THE SIGNIFICANCE of the Bayard Cutting Arboretum lies in the beauty of the plantings of trees and shrubs in an informal manner. It is one of the outstanding examples of informal landscape architecture in America.

"Landscape architecture, primarily a fine art, owes much to the architect, but equally as much to those who have given, through their advanced appreciation and understanding of landscape design, new opportunities for enjoyment to an eager public. Such is the case when in 1952 (after earlier discussion with Robert Moses) Mrs. Bayard James gave to the State of New York her estate Westbrook, now known as the Bayard Cutting Arboretum, in memory of her father, W. Bayard Cutting. In addition, her mother, Mrs. W. Bayard Cutting, established an endowment fund of well over $1,000,000 for the arboretum.

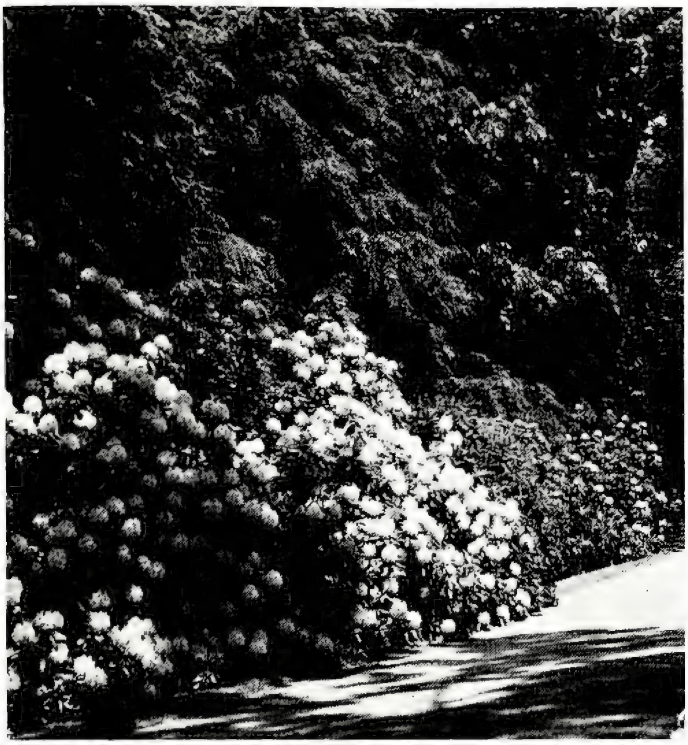
"The purpose of the arboretum, as expressed in the deed of gift, is 'to serve as an oasis of beauty and quiet so that said premises may be a source of pleasure, rest, and refreshment to those who delight in outdoor beauty; and to serve to bring about a greater appreciation and understanding on the part of both the general public and of those professionally concerned with landscape design of the value and importance of informal planting, and thus to be an influence in preserving the amenities of our native landscape.' "

So reads the citation that accompanied the Special Award presented to the Bayard Cutting Arboretum by the Horticultural Society of New York in January, 1963.

William Bayard Cutting had many and varied interests—railroads, ferries, insurance—and also took an active part in civic and educational enterprises. He was a trustee of Columbia College for over thirty years, a trustee of the Children's Aid Society, a director of the Metropolitan Museum of Art, a director of The New York Zoological Society, and a patron of The New York Botanical Garden.

In 1884 Mr. Cutting purchased a tract of land from

Aerial view of the Bayard Cutting Arboretum located in Great River, Long Island. The former residence, now the Administration Building, in the center; the Pinetum, upper left.



Rhododendrons are planted in masses along this woodland walk. Hemlocks furnish a pleasing background.

George Lorillard and a few years later began the development of his estate, Westbrook, in a natural manner with no formal gardens. The original plans were drawn by Frederick Law Olmsted, who made studies in 1887 and again in 1893. Emphasis was placed on trees and shrubs rather than on flowers; on encouraging and fortifying the native plants with other plants, both domestic and foreign, which might adapt to and thrive in the conditions prevailing in this area of Long Island.

The property is part of the Nicholl Patent, an extensive domain purchased from the Sachem of the Connetquot, a semitribe of Indians inhabiting the shores of the Connetquot River in 1683. An early historian recorded: "The surface of this region is level and destitute of stone, the soil light and sandy, with a slight mixture of loam in different places. The meadows are very abundant and yield an immense quantity of the best sedge and salt grass. The bay on the south is four or five miles wide, containing an inexhaustible variety of fish and visited by a countless number of wild fowl at almost all seasons of the year."

Geologic maps for Long Island show the property to be a "thin outwash from ice along Ronkonkoma moraine, with outcrops of Manhasset formation in places and controlling the topography." During the two million years of intermittent occupation by the glaciers, a terminal moraine, now the backbone of Long Island, was formed. The outwash of this moraine deposited sand and gravel and built what is now the south shore of Long Island.

"Norfolk sand" covers most of the Bayard Cutting Arboretum property, according to the soil survey. A thin surface of loam, largely of sand or gravel, covers most of this outwash plain, with stunted pines and scrub oaks the supporting vegetation. Because of the porous sand and gravel surface soils, rainwater sinks to fill the watersheds. (Deep wells furnish water for the extensive plantations.)

The 643 acres, at the time Mr. Cutting acquired them, consisted of woodlands and pastures, and the existing trees were pitch pine, oaks, red and Norway maples. The open fields, now lawn between the mansion and the Connetquot River, was much the same shape, but the surrounding woods were undeveloped.

Mr. Cutting was deeply interested in preserving the natural beauty of the property, whose outstanding features were great oaks and tupelos; marshes and swamps; in-

Among the conifers in the Pinetum walk are: 1) *Picea abies* var. *gregoryana*, 2) *Fagus sylvatica*, as a hedge, 3) *Abies homolepis*, 4) *Tsuga canadensis*, 5) *Tsuga canadensis* var. *pendula*, 6) *Taxus baccata* var. *fastigata aurea*, and 7) *Chamaecyparis pisifera* var. *squarrosa*.

Oak Park on the north side of the Administration Building.

Lower left.
The stalwart trunk of a black oak, *Quercus velutina.*

Lower right.
The massive trunk of an aged European weeping beech, *Fagus sylvatica pendula.*

numerable springs and woodland streams; and three freshwater ponds. He was especially concerned with the introduction of plants which would establish themselves under these conditions and create a naturalistic effect.

After a visit to the Hunnewell estate in Wellesley, Massachusetts, Mr. Cutting added hardy hybrid rhododendrons to Westbrook in large blocks for color. The entrance drives were bordered by rhododendrons, hollies, dogwoods, and leucothoë.

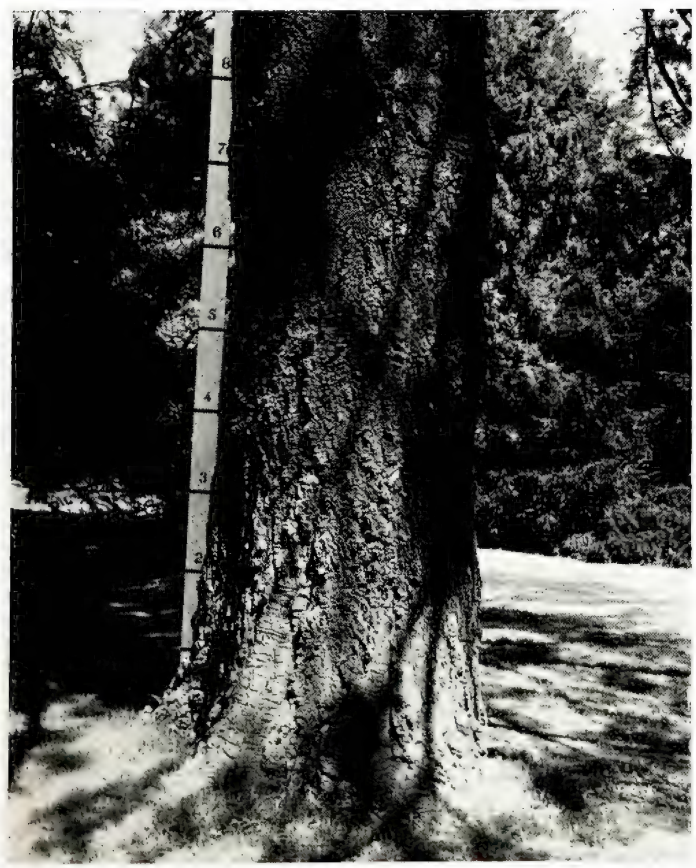
He pioneered the woodland mass planting of rhododen-

drons on Long Island. In *Garden and Forest* (June 26, 1895), edited by Professor Charles Sprague Sargent, an account appears of this planting: "The successful use of rhododendrons in the woods is also interesting as a horticultural experiment on the south shore of Long Island, where the light, dry soil contains apparently very little plant food. It was rightly judged that even near the shore these plants would flourish under the shelter of the woods, which would defend them from driving winds and from the snow-reflected sunlight in winter, if they could only be supplied with proper soil conditions."

Mr. Cutting brought in many kinds of conifers. Most of the mature specimens in the Arboretum date back to the original plantings of 1887. This was intended as a rich collection of trees which "look and feel at home" on the south shore of Long Island rather than as a complete collection of fir *(Abies)*, spruce *(Picea)*, pine *(Pinus)*, and other conifers. Many of the original trees in the Pinetum were imported from England. To these were added trees from western China collected by E. H. Wilson of the Arnold Arboretum and given to the Cutting family by Professor Sargent. Mr. Cutting also obtained trees from Parson's Nursery in Flushing, Long Island, the successor to Prince's Nursery. According to records of Samuel Parsons, some of the first conifers were received from Japan through George Hall, and these later found their way into Mr. Cutting's collection.

Although the period from April through June is the most colorful at the Arboretum—with spring bulbs, Japanese cherries, azaleas and rhododendrons, Japanese crabapples, dogwoods, and a great variety of flowering shrubs—it is the Pinetum that creates a lasting impression. The largest specimens of the Cilician fir *(Abies cilicica)* dates

The Momi fir, *Abies firma*, which is native to Japan, has grown into a fine specimen in the Pinetum of the Bayard Cutting Arboretum.



Abies concolor lowiana, and at left, the lower portion of its towering trunk whose girth, taken at four feet, six inches, is nine feet, three inches; the spread is thirty-five feet.

back to the original planting and now, measuring ninety feet high, stands as a landmark for any approach to the Arboretum. *A. cilicica* is a native of Asia Minor, from Palestine on the Cilician Mountains in Anatolia. Several large specimens of the Greek fir *(A. cephalonica)* are perhaps the most vigorous firs of Mr. Cutting's original plantings. This fir comes from Greece and the Island of Cephalonica between the "heel" of Italy and Greece. Another noteworthy specimen is the Algerian fir *(A. numidica),* whose girth, taken at four feet, six inches, measures six feet, nine inches, and whose spread is thirty-six feet. The Algerian fir is found at an elevation of four thousand to six thousand feet in the Atlas Mountains, in the Province of Kabylia (the ancient Numidia) known as Babor and Thababorat. It is growing with *Cedrus atlantica* and *Taxus baccata* on limestone rock with a scant covering of soil.

On the north side of the residence the woods were thinned by Mr. Cutting. This left vigorous native oaks with enough room to increase unhampered by too close neighboring trees. Today these trees, mostly black, scarlet, and post oaks (*Quercus velutina, Q. coccinea,* and *Q. stellata*) are broad-spreading specimens of luxuriant foliage.

Through the years capable superintendents have maintained the plantings with understanding and intelligence. The health of the conifers and other trees is attributable to the moisture in the atmosphere from the nearby Atlantic Ocean; the sandy gravelly soil that provides excellent drainage; the high-water table; and the windbreaks that protect the more exotic specimens.

In December, 1952, the Long Island State Park Commission took over the jurisdiction of the Bayard Cutting Arboretum when Mrs. James surrendered her "reserved" rights to further use of the property. She designated a Board of Trustees to have full control over the disposition of the endowment fund. Dr. William J. Robbins, then Director of The New York Botanical Garden, was named one of the trustees. Dr. William C. Steere, the Garden's Director, now serves as a trustee.

The Bayard Cutting Arboretum was formally opened to the public on May 15, 1954, and since then approximately one million people have visited it. Of the total acreage only one hundred acres, the area south of the Montauk Highway, is accessible to visitors. The other acres are buffer lands and forest preserves, protecting the west branch of West Brook. There is a vehicular charge of fifty cents for parking pleasure cars and a charge of four dollars for buses. The two paved parking lots accommodate two hundred cars; on busy week-ends, cars can also be parked on indicated grass areas.

The former Cutting residence is the Administration Building of the Arboretum, in which are located the offices of the Director and park police; a food bar; and the William Henry Trotter bird collection. The Annex provides rooms for educational meetings on horticultural or natural history subjects.

During the nine years of operation under the Long Island State Park Commission, the existing plantings have been maintained in excellent condition, conifers and broad-leaved evergreens are being added, and new woody plants are being tested for hardiness.

NEW FRONTIERS IN ROSE BREEDING

By DENNISON MOREY

Dr. Morey is Director of the California Research Department of Jackson and Perkins Co. of California at Pleasanton.

EVERYONE WHO HAS studied the problem carefully is aware that the possibilities for vastly improved varieties of garden roses are tremendous. The reasons why progress is slow lie, I believe, in two primary areas, one technical and and the other commercial (especially the nebulous realm sometimes called merchandising). I am convinced that the technical problems are minor when compared to those presented by merchandising.

The American gardening public, and much of the nursery industry as well, seems to be not only reluctant to accept, but antagonistic to *true* novelty. The public rejects anything except that which is currently fashionable—the Hybrid Tea rose and its closely related derivatives. This is borne out by the ease with which the same "old bowl of porridge" can be successfully promoted by nurseries.

Observation of the situation in Europe might lead one to the conclusion that here in this country there is a vicious circle in which the nursery industry unconsciously (or consciously) keeps the American garden enthusiast in a deep rut of habit. A little effort and imagination would, however, set him free.

In Europe and Great Britain it is possible for a nursery to offer and sell *genuine* rose novelties. The many species hybrids of Kordes aptly illustrate this point. Moreover, these same plants are used and enjoyed in British Columbia. It may very well be that the first point, that the public resists novelty, is actually the result of the second, that the industry promotes a basic conservatism. It may be that the American home owner is not devoid of imagination, curiosity, and skill.

Nonetheless, as matters now stand, there is little to encourage any breeder of roses from straying far from the well-trod and often abused paths of current fashion. This is, I believe, unfortunate. It is unfortunate for the American who buys and uses ornamental plants, and it is unfortunate for the breeders who realize what can be accomplished in developing improved garden roses.

Too few people realize that of the three hundred or so species of wild roses, nearly all of which have ornamental value, and nearly all of which are hardier and freer from

pest and pestilence than cultivated forms, barely a dozen have been used in the development of our modern kinds. To be sure, serious technical problems have made the utilization of many of these species fruitless, but these obstacles can be and in several critical instances have been overcome within the past five years.

The "new frontiers" in rose hybridizing are unfortunately fraught with financial peril, but the opportunity for the pioneers (especially should the ultra-conservatism of the American rose buyer be an artificially induced lethargy) is very great.

Within the past five years natural and artificial tetraploids of *R. bracteata, R. laevigata, R. virginiana,* and 'Max Graf' have provided hybridizers with potent vaulting devices with which to hurdle the technical barriers once so formidably barring the paths to the future. Moreover, fertile derivatives of *R. setigera, R. spinosissima,* and *R. canina* (in several forms) have become available for practical use. In addition, numerous mutations have been collected and stabilized which are of intense interest. One of these is the tetraploid dwarf and the diploid semidwarf habit presently restricted to the so-called "compacta" roses of the Seven Dwarf series.

Of particular interest are the artificial tetraploid *R. bracteata* and *R. laevigata* materials of my own derivation, the *R. virginiana* tetraploid hybrids of Robert Basye, and the "Lorelei" and "Star of Bethlehem" breeding line developed by Raymond Fisher. All the above are useful and productive in crosses with regular garden roses, a situation not always prevailing in species hybrids outside those species closely related to garden roses. These materials are important for several reasons. First, they can be used with common, fashionable garden roses; second, they produce some fertile progeny; third, some of the early derivatives are truly desirable ornamentals; and fourth, all are sources of magnificent *disease-free* foliage. Careful, intensive use of these lines of endeavor will surely see the day when garden roses do not mildew, blackspot, or rust. My own studies show that resistance to mildew and rust is primarily a mechanical and developmental phenomenon and only incidentally physiological. Moreover, my own analysis of available data shows that while blackspot-resistance has a strong physiological element, practical resistance is mechanical and developmental. Why else does the variety 'Goldilocks' show very high blackspot-resistance in vitro but not in the garden and *R. laevigata* high susceptibility in vitro but almost complete immunity in nature?[1]

Never before has an equivalent opportunity existed for rapid, effective advances in roses. The probability is high that were these new areas for progress opened, the rose would become the finest and most easily grown as well as the best loved of all ornamental plants. There is only one fly in the ointment: will the American public support an endeavor dedicated to the production of new, different, but inherently better roses with the purchase of the results of such a breeding effort?

The public does in Germany. Roses are also used for shrubs and specimen planting in France, England, Spain, Holland, Belgium, Italy, Canada, Denmark, Sweden, Norway, Ireland, and elsewhere.

Forward-looking rose breeders are poised at the "new frontier." Some of us undoubtedly have the makings of pioneers, but without the support of the gardening public we all know that what should be a land of promise for everyone can become a chasm of frustration and disaster.

Hybridizers are eager to forge ahead. Because we have a clearer picture of the possibilities than the average person, we shall undoubtedly push forward. In this connection it will probably be useful to present a word picture of my impressions of some of the results of our future efforts beyond these new frontiers in rose breeding.

As is true of presently existing species hybrids currently on the market such as 'Clare Grammersdorf', 'Kassel', 'Hamburger Phoenix', 'Raubritter', and 'Will Scarlet', these newer efforts will be everblooming shrub roses. They will be fragrant as a group, with large flowers, ordinarily quite double, and possessing buds and stems suitable for cutting. Unlike many species and species hybrids, the flowers will be durable both on the plant and in the vase. Within ten or fifteen years after intensive effort begins (with good luck and public enthusiasm—this could be before 1965) these new roses will come in all shapes and sizes and will bear flowers as perfect as that of any Tea or Hybrid Tea rose. And the better selections will be genuine minimum-maintenance plants. They will be winter-hardy, often semi-evergreen; all will have magnificent disease-free foliage; many will be resistant to or tolerant of spider mites and thrips, and some even distasteful to aphids. Even today certain currently fashionable varieties show from one to several of these traits.

Perhaps I can best express my own enthusiasm by describing in familiar terms a goal which I think is entirely possible, the paths to which are replete with fine garden roses.

I can see roses as hardy as *R. rugosa* with foliage as fine as the foliage of that species, and even more broadly resistant to disease; foliage as large and shiny as that of *R. laevigata* and as disease-free as that of *R. virginiana;* plants as handsome as a fine specimen of 'Maman Cochet'. These roses will have blooms of all sizes and shapes from single to fully double, from three inches to eight inches across, some borne in small clusters, others in solitary splendor, intensely and diversely perfumed; and with buds of charm and elegance. The flowers themselves will be gracefully borne on long, strong stems—above plants which will be completely hardy in Zone 3. Moreover, even though completely hardy, these roses will be in bloom from spring frost to winter freeze (in mild climates the year 'round) in unbelievable profusion.

Because of freedom from foliage ills, the plant's energy will go into making growth and flowers, not to feeding pests and diseases. What is more, the flowers will be unusually long-lasting in the vase or on the plant.

These roses will need ancestors. The ancestors themselves will often be plants of great charm and beauty, but whether they will receive sufficient public acceptance remains to be seen. Yet it is essential that the American public learn to appreciate and use roses as hardy shrubs in order to give necessary support to the breeding program. If this can be accomplished, a surge of extraordinary progress will ensue.

(1). Palmer, J. G. and P. Semeniuk. 1961. Am. Rose Ann. pp. 125-133.

THE ROSE

By JOHN ASCH

The following is based on the chapter, "The Rose," in a book which Mr. Asch is writing on the mythology, folklore, history, and uses of plants. Mr. Asch is always seeking to define the benefits that man has derived from the plant kingdom.

ROSES ARE CULTIVATED more extensively throughout the world than any other plant. Their beauty, fragrance, and exquisite coloring have a universal appeal. In the United States alone, almost fifty million rose bushes are sold annually by the wholesale trade, and more than one billion roses as cut flowers.

Rosa, the botanical name of the genus, is an ancient word adapted from the Greek *rhedon.* According to Dodoen's Herbal, the rose was so called by the Greeks "because of its excellent smell and pleasant savour . . ." The species are found in the northern hemisphere from the Arctic Circle to northern Africa, Mexico, and India. From the study of fossil remains, geographical distribution, and genetic similarities, it is believed that all roses descended from one source which appeared about thirty-five million years ago.

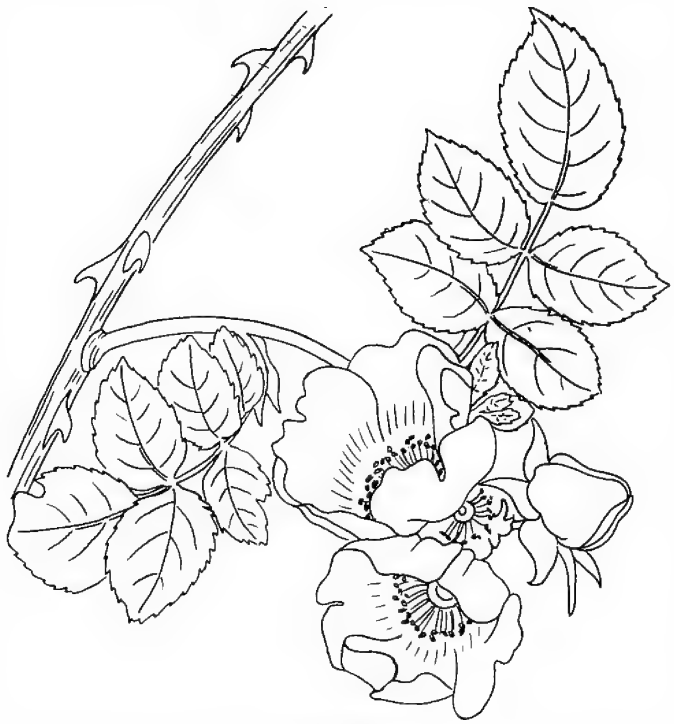
The changes which had taken place—both natural and man-made—led Linnaeus, when classifying roses in 1753, to say: "The species of *Rosa* are very difficult to determine, and those who have seen a few species can distinguish them more easily than those who have examined many."

Roses were cultivated in Persia at least five thousand years ago. From Persia they spread through Mesopotamia to Palestine and across Asia Minor to Greece. Greek colonists carried them to Italy, and the Romans distributed them through the then known world. Roses were also brought to Europe by physicians (herbalists) who accompanied the armies of Alexander, the Romans, and later the Crusaders. Different kinds were domesticated and grown in large quantities for medicinal purposes, perfumes, and condiments, and for use at fetes. The popularity of the rose was very great during the entire Roman Empire. Nero is said to have spent four million sesterees (about one hundred thousand dollars) on roses for a single orgy.

After the fall of the Roman Empire, the rose was kept alive in the dark ages by dedicated Benedictine Monks. In their monasteries it became the emblem of Christianity.

During the Renaissance the production of new varieties was accelerated. Voyagers, sea captains, and plant hunters brought roses to England and the continent from newly discovered lands. Empress Josephine, Bonaparte's spouse, established her famous rose garden at Malmaison, Versailles, in 1804. It was here that P. J. Redouté, the most famous of all rose illustrators, executed his magnificent paintings.

Most people believe roses are plants of the western world, but many kinds were grown in Chinese, Japanese, Korean, and Indian gardens for centuries before they were introduced to European and American gardens in the eighteenth century. The valuable characteristics of recurrent blooming, climbing, pleasing odors, and unusual colors possessed by some of the Oriental roses were transmitted by hybridization to the roses of the West. The majority of the gorgeous roses in present-day gardens—the Teas, Hybrid Teas, Polyanthas, and Floribundas—have parentage traceable to the older Oriental roses.



Rosa eglanteria.

ITS VIRTUES

Many and varied are the virtues of the rose in addition to its use as an ornamental. Pliny mentions thirty-two remedies compounded from rose petals, leaves, or hips in the form of ointments, tinctures, pastilles, lozenges, pastes, and liquids. Its use in medicine has all but disappeared except in a few countries, such as Iran and India.

As a base for cosmetics the rose is unexcelled. It was an important ingredient of the original cold cream, invented by the famous Greek physician Galen in the first century A.D.

Rose water was an important cleanser and purifier. When Saladin conquered Jerusalem in 1187, he used five hundred camel-loads of rose water to purify and sanctify the Mosque of Omar, which the Crusaders had used as a church. St. Sophia was also purified with rose water, when Mahmoud II captured Constantinople in 1453.

The manufacture of attar or otto of roses, the essence of roses, a base for many perfumes, was discovered in 1011 by Avicenna, the famous Arabian philosopher and physician. Today Bulgaria is the center of manufacture. About twenty thousand pounds of flowers are required to make one pound of essence, which sells for about $500 or so. Several tons are produced annually.

Dried rose petals are used in scenting teas and as a substitute for tea in a number of countries. A paste prepared from rose petals sweetens and flavors foods. Delicious conserves and garnishes are also made from rose petals. Buds and hips are used as condiments. The latter contain a rich store of Vitamin C (ascorbic acid). A scented liquid known as "dew of roses" is a cooling summer drink. Vinegar and wine from roses have long been famous.

The expression "bed of roses" comes from the custom of stuffing pillows and mattresses with rose petals in ancient

Rosa gallica.

Egypt, Persia, Greece, and Rome.

Mythology and Folklore

There is scarcely anyone of note in the world's literature who has not paid a willing tribute to the beauties of the "bloom of love." Anacreon, who lived in the fifth century A.D., is credited with the earliest poem on the rose.

I sing of spring, flower crowned,
I sing the praises of the rose,
Friend aid me in my song.
The rose is the perfume of the Gods, the joy of men,
It adorns the Graces at the beginning of Love.
It is the favored flower of Venus.

Sappho sings the praises of the rose in an ode which has suffered at the hands of several translators. This ode is in one of the few fragments of her lyrical poems, epigrams, and elegiacs, and the first few lines read:

If Jove should give the happy bowers
A queen for all their love of flowers,
The rose would be the choice of Jove.

Homer, in *The Illiad,* writes that Aphrodite to protect Hector's body "annointed him with roses sweet oil ambrosia . . . "

In the *Wisdom of Solomon* (2:8) it is written: "Let us crown ourselves with rose buds before they are withered."

And Shakespeare has Juliet say,

"What's in a name?
That which we call a rose,
By any other name would smell as sweet."

Legends of many lands link the origin of the rose to goddesses of beauty and love. Botticelli's masterpiece, "The Birth of Venus," depicts roses appearing with Venus as she emerges from the foaming sea. By rearranging the letters of the word "rose," according to the rules of the cabala, we get Eros, the god of love. The rose has always been the flower of romance. All love philters contained rose petals or rose water or rose essence. Garlands of roses were worn by bride and groom, and even by wedding guests, at marriage ceremonies. At Salency, France, during the sixth century, it became the custom to choose the Rosierre, "The Rose Queen," the maiden who was most virtuous and beautiful.

The Greeks and Romans placed a white rose in a room, or used a room with a ceiling on which a rose decoration was sculptured, when discussing secret matters, and so the term *sub rosa* became a symbol for secrecy.

In feudal England fines and rents were paid with roses. Some overlords demanded their rents be paid in "roses at Christmastime and snowballs in summer"; by such means they kept their workers as fiefs, or could terminate a tenancy at will. In many places in England and at West Grove, Pennsylvania, a "red rose rent day" is celebrated to this day.

There were many military orders of the rose. The ancient town of Carya on the Isle of Caria (Rhodes) issued the earliest coin depicting a rose before 480 B.C. Many heraldic devices employed roses to illustrate that "beauty is the reward for valour." Roses appear on postage stamps of many nations.

Long before the Christian era the rosary, containing a rose hip or bead for each prayer, was used in North Africa, India, China, and Japan. It was introduced into the Roman Catholic Church in the twelfth century by St. Dominic, who conceived the idea while holding a garland of alternating white and red roses. In 1049 the presentation of the "Golden Rose" was initiated by Leo IX. On the fourth Sunday in Lent the Pope blesses a spray of roses carved in gold; this is sometimes presented by the Pope to a sovereign or member of a ruling family for exceptional deeds.

Kinds

Ayreshire rose *(Rosa arvensis)* is one of the ancestors of the modern climbers and ramblers, having been used as a parent because of its hardiness. It is a white-flowered rose, a native of the British Isles, and is widely distributed in wastelands in central and southern Europe, where it climbs on hedges and thickets and even as much as sixty feet up tree trunks. This is the true "white Rose of York."

Dog rose *(R. canina)* grows in Europe, Africa, and western Asia. It has solitary white or pinkish flowers and may attain a height of ten feet. Syrup made from its hips was supposed to cure hydrophobia, hence its common name. *R. canina* is very rich in ascorbic acid (Vitamin C) and was the major source of this vitamin in England during World War II.

Cabbage rose *(R. centifolia)* bears very fragrant, large, solitary, pink flowers. This is the rose of many petals described by Pliny, Theophrastus, and many other writers. Herodotus tells us that in the gardens of King Midas "there are roses which grow of themselves, so sweet that no others come near them, and with blossoms that have as many as sixty petals apiece." *R. centifolia* was later known as Batavian (Holland) rose and rose of Provence. In monastery gardens it was known as the "rose of Rove." Chaucer re-

ferred to it as the "rose of Rhone." The French called it "Rose à Cent Feuilles," and grew it in enormous quantities near Marseille for rose water and other purposes. Its petals, distilled in water, yield rose water, manufactured in large quantities in the Grasse district of southern France today.

Damask rose *(R. damascena)* bears clusters of very fragrant, pale pink to red, double-petaled flowers. This rose has been mentioned in legend and history for centuries, but its origin is in doubt. It reached Europe by way of Egypt. From the earliest days it was esteemed for its supposed medicinal values. It is so intensely fragrant that it was a major source of commerce from 1800 B.C. to the Dark Ages. Virgil, in his Georgics, is the first to describe it as "remontant," or having a second bloom. This is the famous Roman rose of Paestum and Pompeii. It is recorded by early Persian, Greek, and Turkish writers and depicted on their tiles and pottery.

Sweet brier or Eglantine rose *(R. eglanteria)* is the only English wild rose in cultivation. Its pink blossoms are borne solitary or in clusters. Its fine fragrance—like that of old Pippin apples—is noticeable even before its flowers appear. It suckers freely and perpetuates itself by this means; the current shoot is some distance away from the place where the original root was planted. It was a very popular rose in olden days, and in England there are some plants over a thousand years old. *R. eglanteria* has naturalized in North America and is common in pastures; it has also escaped cultivation in Australia where it covers thousands of acres of wasteland.

French rose or rose of Provins *(R. gallica)* bears solitary, pink or crimson flowers. Its extensive cultivation in Provins, a town near Paris, gave it its name. Its origin is in doubt. It was grown in religious gardens in Ethiopa and Egypt where, used as a funeral plant, it acquired the name "rose of the tombs." It was taken to Spain by the Moors in 711 A.D., and Arabian herbalists refer to it as the Spanish rose. A monk first mentioned *R. gallica* in England in 1386: "The red rose is ye badge of England, and hath growne in this countrye for as long as ye mynde of man goeth." Either this rose or the Damask rose *(R. damascena)* became the badge of the House of Lancaster. It was one of those depicted by artists on canvas and in stained glass windows. It was probably one of the first roses brought to America by the early settlers who called it the "apothecary rose" because of its medicinal value. Today it is found growing naturally throughout Europe, western Asia, and many parts of North America.

Rugosa rose *(R. rugosa)* originated in central Asia and was taken to Japan from China or Korea before the tenth century. It bears large red or white flowers. *R. rugosa* is so hardy that it has become an important rootstock for tree roses.

White rose *(R. alba)* is a natural cross between the rose of Provins and *R. corymbifera.* It bears fragrant, large, white or pinkish flowers. It came to England in 1597 and was called the Jacobite rose and the Andrews rose. It is erroneously referred to as the York rose; the true York rose, which featured in the War of Roses (1455-1485), is *R. arvensis.*

Bengal or China rose *(R. chinensis)* is evergreen or nearly so, and bears red to nearly white flowers in small clusters. This rose has the recurrent or everblooming quality which has been bred into the western roses. The first living plant came to Holland in 1781 and to other European countries in the nineteenth century. A close relative, the miniature rose *(R. chinensis minima),* was found growing in Mauritius in 1810. It became known as the "fairy rose" in England. Only six to eight inches high, it is a very popular house plant today.

Tea rose *(R. odorata)* is usually evergreen. Its branches are partially climbing, and bear very large, white, pink, or yellow blossoms, solitary or in small clusters. This aristocrat of the rose world, which came from China, derives its name from its fragrance similar to that of crushed fresh tea leaves. It was found growing near Canton in 1809 and is one of the ancestors of modern Hybrid Teas.

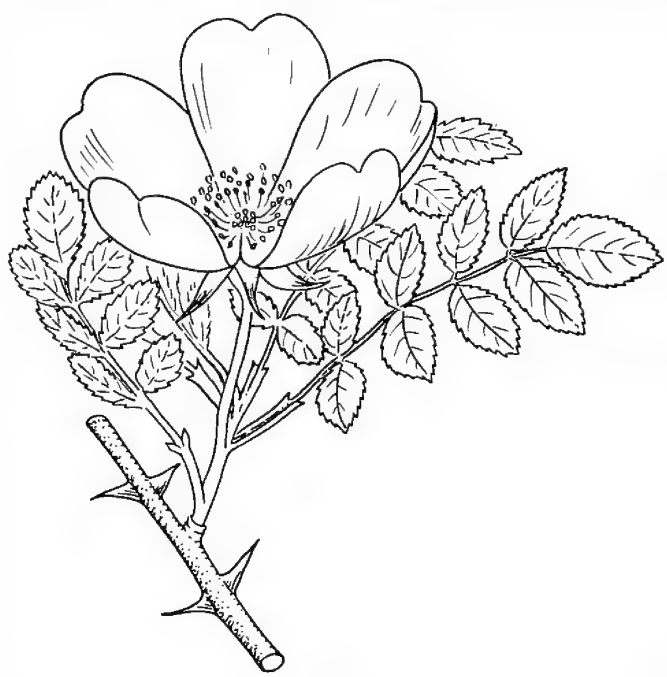
Japanese rose *(R. multiflora)* is a climbing or trailing shrub with very fragrant, white or deep pink flowers borne on large clusters. It was brought from Japan to England in 1865, and is a parent of the Polyanthas and Floribundas. The 'Crimson Rambler' variety was found in a Tokyo garden in 1878. This is the rose that furnishes us with our "living fences."

Cherokee rose *(R. laevitiga)* is evergreen, climbs to fifteen feet, and bears large, solitary, fragrant, white flowers. It was brought to southern North America in the early seventeenth century and spread so extensively that the first European botanists who visited our shores in the early eighteenth century believed it was native to America and gave it its name.

Hardy Cherokee rose *(R. spinosissima altaica),* which originated in the mountains of Siberia, forms a pleasing rounded shrub about six feet high. It is a vigorous grower and produces single, white blossoms tinged with yellow.

Scotch or Burnett rose *(R. spinossissima)* is a parent of the hardy Cherokee. This spiny bush usually has small white flowers tinged with yellow, but some forms bear pink or

Rosa hugonis.



yellow blossoms. It thrives in any soil and many climates, and establishes well on sloping banks to prevent erosion. It is very ornamental in semidense woodlands and in informal border plantings, and is excellent as a hedge.

Sulphur rose *(R. hemisphaerica)* was the first yellow rose to reach Europe, where it caused quite a sensation. It was taken to Calcutta from Turkey about 1500 A.D., and to Holland in 1600 by the famous botanist Clusius. Its large, double, yellow blossoms have an unpleasant odor. The sulphur rose does not do well in rich soil and impure air, and it should not be pruned.

The Persian yellow rose *(R. foetida),* which was brought from Persia to England in 1847, has flowers of beautiful yellow and orange hues, and is one of the parents of the Hybrid Teas.

The "golden rose of China" or Father Hughe's rose *(R. hugensis)* was the most extensively advertised, best known, and most widely planted rose in the early 1900's. It blooms so profusely in May that its branches become long garlands of short-stemmed, light yellow flowers almost concealing the foliage.

The 'American Beauty' rose is a Hybrid Perpetual. Its parentage is very complex, for Hybrid Perpetuals link the roses of the East to those of the West. Many members of this group have twenty or more kinds of roses in their genetic make-up. At one time there were more than three thousand varieties of Hybrid Perpetuals, which were very popular for over fifty years. The most famous was 'Mme. Ferdinand Jamin', renamed the 'American Beauty' when it reached the United States in 1882. It was chosen the floral emblem for the District of Columbia.

Hybrid Teas appeared in 1865 and are the most popular of all time. The results of crosses between the Teas and the Hybrid Perpetuals, they are obtainable in almost any color and combination of colors except blue. 'Peace' is one of the most prominent of the more than four thousand named varieties.

Sweet as the rose that died last year
Is the rose that is born today.

COSMO MONKHOUSE

GARDEN IN MIDSUMMER (Continued from page 87)

cardinal flower *(Lobelia cardinalis),* the handsomest red among plants. It stands in front of *Clethra alnifolia,* a shrub which produces spikes of fragrant, cream-colored flowers. Nearby on the margin of woods *Lobelia siphilitica* has seeded itself and, being left alone, has continued to come up in several places in the border. It does grow a bit rampant, but its spires of deep blue flowers are so beautiful they are always welcome.

Two striking plants which bloom for many weeks (all through August into September) are tall, bushy relatives of the humble little salad burnet. One is *Sanguisorba obtusa* from Japan growing to six feet high, with spikes of small rose-tinted flowers. The other, which blooms a little later in my garden, is *S. canadensis,* native to eastern North America. It has clublike spires of fragrant, cream-colored flowers. They form thick clumps and because of their height belong at the back of the border. The stems of *S. obtusa* require staking.

Years ago in Hyde Park, London, I saw growing in semishade a magnificent leafy groundcover twelve inches high, called gold-flower *(Hypericum moserianum).* It was listed as a hybrid between *H. patulum* and *H. calycinum.* I brought some plants home with me. The numerous stamens of the yellow, cup-shaped flowers, two and a half inches across, have orange tips. The plants thrive lustily, but they bloom sparsely—perhaps this is the result of their being in the sun. However, as they are so hardy and otherwise healthy, I have not moved them to another location. Moreover, as their pale green, softly textured stems turn red, and their opposite, ovate leaves of the same size all the way up the stem are so attractive, I enjoy them in spite of the sparsity of blooms.

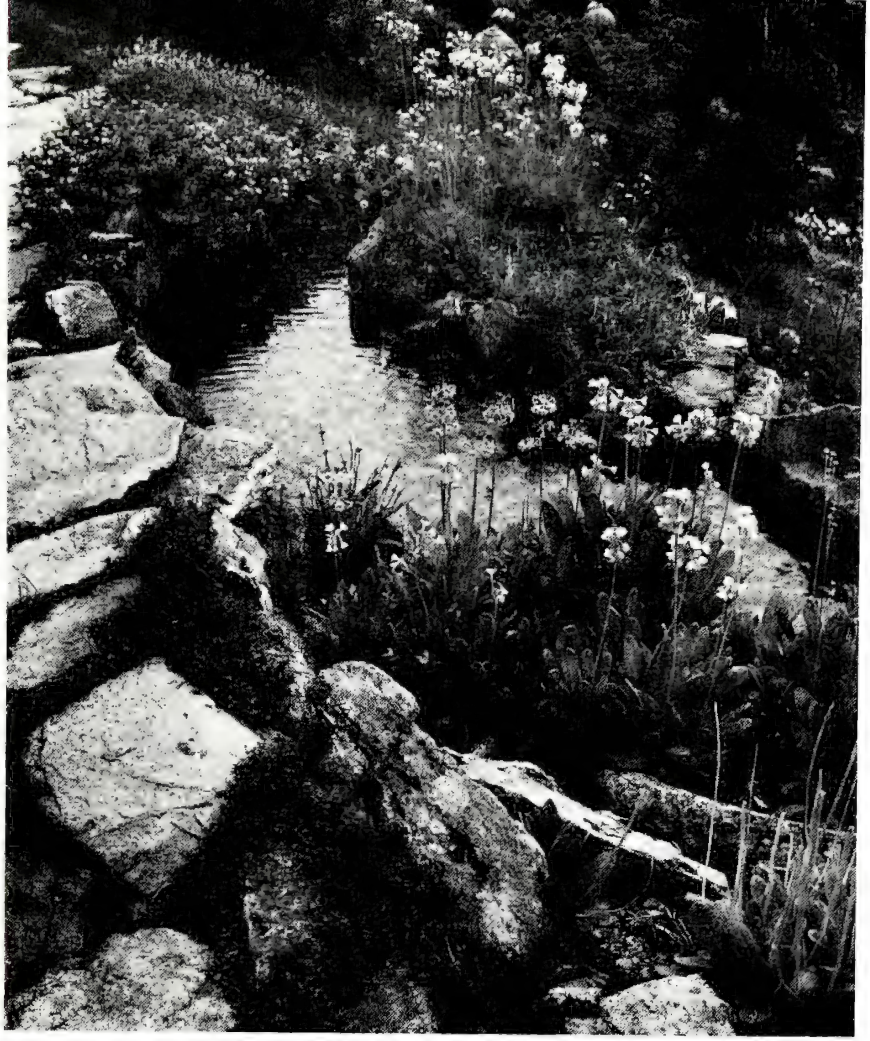
Late in summer appear two blue-flowered plants. The first is *Salvia azurea,* native to the deep South and westward to Texas. The wiry stems, two to four feet long, bend unless they are staked. The leaves are narrow, about three inches long. Leaflike bracts subtend the crowded floral whorls of pale sky-blue flowers, each about one inch long and of soft texture. *S. azurea* is planted as an accent at the four corners of the herb garden, where for a few weeks they are the most conspicuous plants in bloom. The other blue flower goes by the frightening name of *Cerastostigma plumbaginoides,* formerly *Plumbago larpentae.* It is low and spreading, with woody red-tinted stems and alternate, obovate leaves which have ciliate margins. The five-petaled flowers, one-half inch across, are tubular. The charm of *C. plumbaginoides* is its green leafiness and the little terminal clusters of flowers of bright cerulean blue. They make a pool of color in the front of the late-blooming border.

Then there are the hostas which belong to the Lily Family and came originally from Japan and China. They are very easy to grow if planted in semishade, under trees, mountain-laurel, or evergreen azaleas. The flowers in spikes or racemes are violet, gray-blue, or white. The oval leaves may be lance-shaped or heart-shaped at the base, and have long pointed tips; they are usually strongly ribbed, deep green, blue-green, or gray-green, sometimes white- or yellow-margined.

The last flowers to bloom in my garden are sedums: *S. sieboldii* from Japan, with roseate flowers about thirteen inches high; and *S. spectabile,* from Japan and central China, with bright red flower-heads borne on stems about eighteen inches high. Both have soft gray-green leaves.

Of course, there are shrubs that flower in midsummer. Perhaps the most conspicuous is the dwarf horse-chestnut, *Aesculus hippocastanum pumila,* not over six feet high and with a very wide spread, and bearing the characteristic candle-like inflorescence. It is a dramatic plant. *Vitex agnus-castus* has palmately divided, fragrant leaves and spires of long-lasting violet or white flowers. There is also *Tamarix pentandra* with frothy racemes of dainty pink flowers forming large panicles on its branches. The leaves are small and heathlike. And beginning to bloom in May and repeating all summer long are two- to three-foot-high varieties of *Potentilla fruticosa,* with white, pale or deep yellow flowers.

My garden is a delight in midsummer.



FLOREALPE
A Swiss Alpine Garden

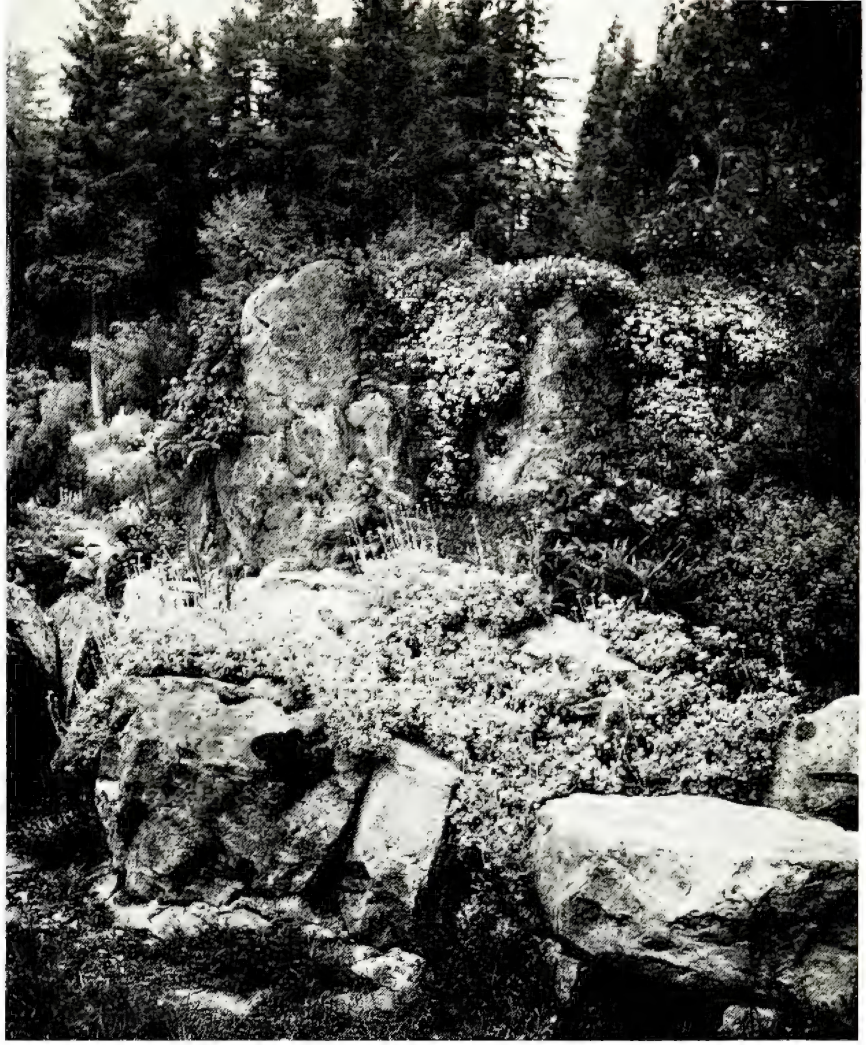
By ALICE DUSTAN KOLLAR

Mrs. (Samuel) Kollar is a landscape consultant, Garden Editor of the *Newark Star-Ledger*, author and lecturer. She frequently conducts a garden workshop.

Toward the center of the two-acre slope, this placid primrose-edged pool was, at the time of our visit in early July, the jewel of the whole garden. We were not surprised to learn that this colorful planting comprises the most important private collection of *Primula* in the world.

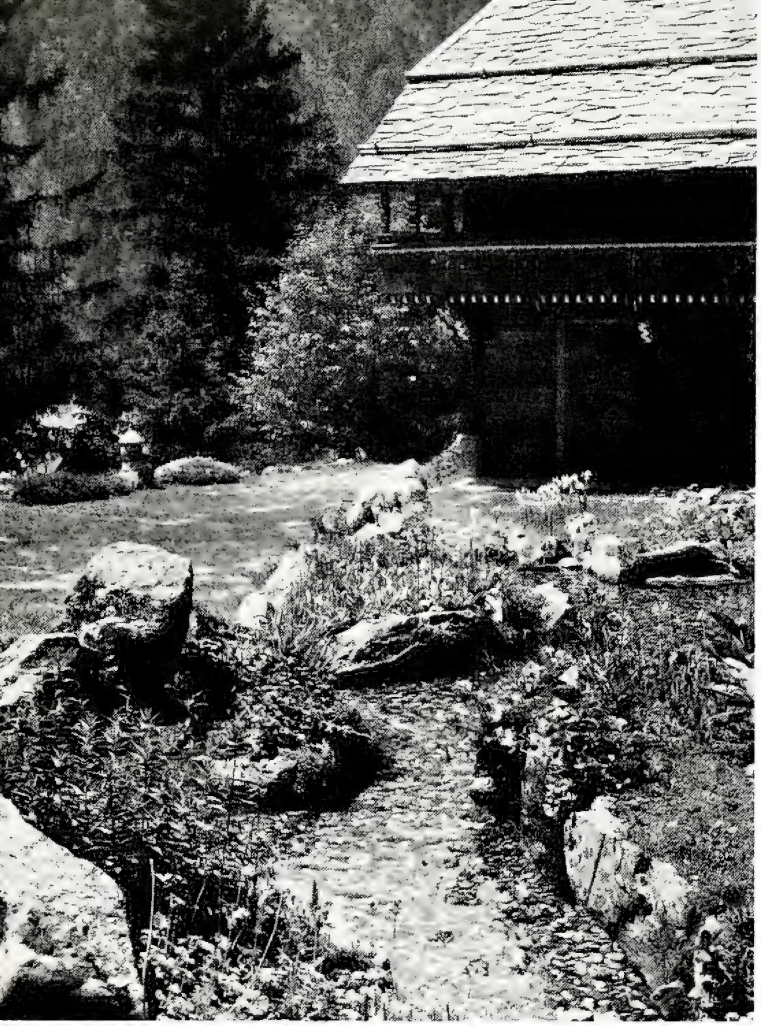
Rarest species of all, and still growing in a pot in the nursery area, is *Primula redii willia*. This diminutive plant with its large lavender flowers is native to the Himalaya Mountains.

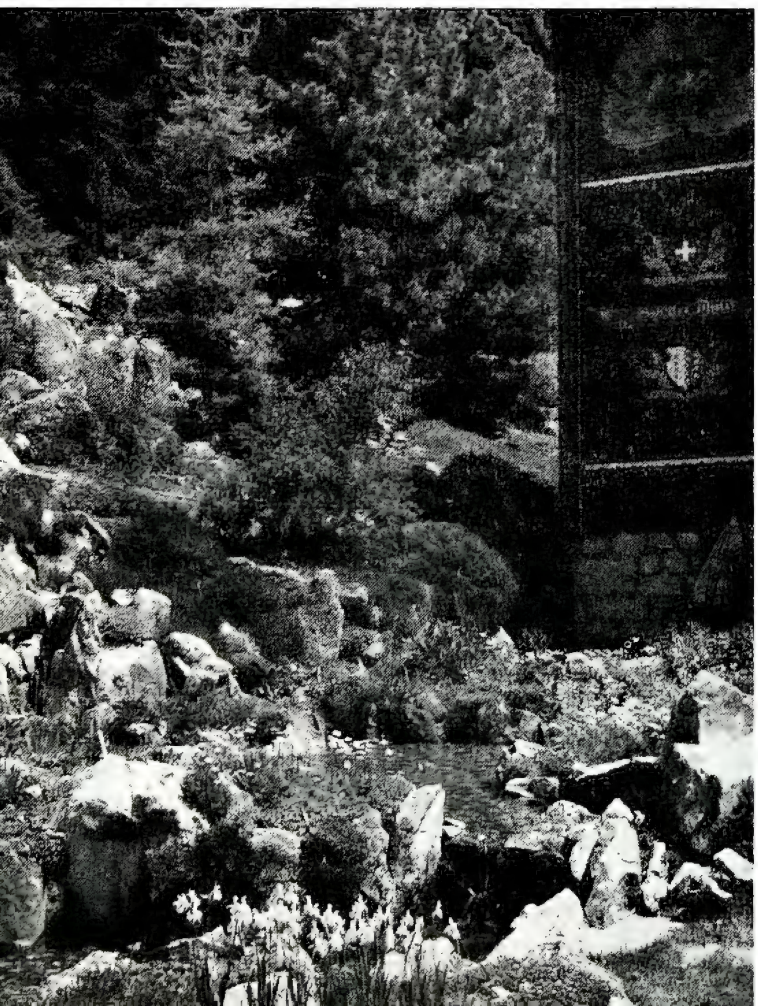
Beside steps near the owner's house a dwarf broom, *Genista pilosa*, contrasts with the bold-leaved *Ligularia clivorum*. Foliage textures weave so enchantingly through the garden that they would make it attractive even without floral accent. Some of the flowers noted were lavender *Dodecatheon jeffreyi*, the tiny pink *Androsace mollis*, the rich blue *Gentiana angustifolia*, and the softer blue *Aquilegia bertoloni*.



Where nature leaves off and the hand of man takes over, either in rockery or in planting, is almost indiscernible at Florealpe. The gray-foliage pattern of Senecio *cineraria* in the foreground blends perfectly with the granite rocks. A weeping spruce trails over the cliff ledge, to echo the greenery of the forest background.

In dozens of frames, grouped in the work area at the top of the grounds, the gardener raises rare plants from seeds which have been obtained from the far corners of the globe. Here we saw several *Meconopsis* species, including the blue-poppy of China, *M. betonicifolia*, blooming near Virginia-bluebells, *Mertensia virginica*.





Primroses at their colorful best the first week in July—that is the treat which greeted two American gardeners on their visit about a year ago to Florealpe, Champex, Switzerland.

My husband and I had read in the British *Gardeners' Chronicle* about the outstanding private rock garden of Monsieur J. M. Aubert which thrives at an altitude of five thousand feet in the Swiss Alps. In planning our three-day stop in the vacation village of Champex, we never dreamed of such good fortune as finding Florealpe at the height of what would be May bloom in the New York City area.

Florealpe is only two acres in extent but seems much larger because of its hillside location and its world-wide collection of plant treasures. The owner opens it free to the public for exactly one hour a day, beginning at 11 a.m. At noon a bell tolls "exit," and visitors depart through a gate tended by the gardener's son.

Monsieur Aubert obtains seeds of rare plants from similar climatic zones throughout the world. His gardener raises them and brings them into flower in individual pots in frames. Then, as plants multiply sufficiently, they are arranged in garden situations which suit their cultural needs and set them off artistically.

Except for such studied touches as a little bridge or a bench, essential paths and steps, the Florealpe garden could be that of a natural rock outcropping and scree below the towering spruce forest which reaches into the clouds above. Streams flow through it, spurting here and there into little waterfalls or slowing into serene pools. And everywhere on slopes and in rock crannies grow plant treasures.

On our second day we caught a glimpse of M. and Mme. Aubert beside their chalet on the grounds, but we did not approach them. We felt they preferred their privacy, that they were giving the public enough by opening their grounds at a given hour. Some of our questions were answered by plant labels and others by an illustrated pamphlet available for a small sum.

We had been so busy snapping pictures during our first two precious hours in the garden that we felt almost relieved for the mist which enveloped the mountain on our third and last visit. The dull weather gave us a chance to examine individual plants and to enjoy a short chat in French with gardener Anchisi Egidio.

Every spring he and his wife and five children come up from the valley far below to occupy one of the charming chalets on the property. He tends the whole garden and keeps it replenished from seedlings he raises in the work area. When we expressed admiration for the weedless perfection of the grounds, the gardener explained that he devotes a week to weeding alone on his arrival at Florealpe in the spring. After that, weeds fail to appear the rest of the season!

Fortunately the alpine treasures do thrive. Sedums and veronicas form mats which hold the soil on the slopes. Penstemons and columbines display showy flowers above foliage pushing out of rock crevices. Dwarf cotoneasters and saxifrages drape gracefully down sheer rock faces to dip into mountain streams. Primroses and shooting-stars are reflected in pools so clear that every pebble may be seen in the bottom.

Full of delightful surprises, Florealpe is a garden where these visitors could have profitably spent three solid weeks of study—instead of three fleeting hours.

Upper Right. A long pool catches water from the slopes above, every pebble shows in its clear depths. Moisture-loving plants grow in soil pockets at its edge. The gardener's chalet gives background.

Lower Right. The same pool, with the rare white *Roscoea cautleoides* from China blooming in the foreground. Larch, pine, and other conifers grow near the owner's house with its gaily-colored floral emblems.

CONVERSATIONS ON ECOLOGY III

This series of letters was started in the January-February issue of *The Garden Journal* by Dr. Pierre Dansereau. The writer of the present contribution is Dr. Robert R. Humphrey, Professor of Range Management at the University of Arizona, in Tucson. He is the author of many papers on range ecology and the range types of the Southwest, and his book entitled *Range Ecology* has recently been published by The Ronald Press Company, New York, 1962.

THE UNIVERSITY OF ARIZONA
DEPARTMENT OF WATERSHED MANAGEMENT
TUCSON

Dr. Pierre Dansereau
The New York Botanical Garden

February 28, 1963

Dear Pierre:

Your request that I contribute to "Conversations on Ecology" for The New York Botanical Garden's journal came to me as a pleasant surprise and a flattering one. I have been working for so long on the applied side of ecology that I sometimes wonder whether the "pure" ecologists consider me any longer as one of the clan. I, like Frank Egler, Heinie Oosting, and Rex Daubenmire, was one of Cooper's students at Minnesota. Many years have elapsed since we were there together, and we have all gone our various ways. Only I, however, gravitated into the applied side of the field. That gravitation came as a matter of economic necessity and a job that was available in the depression year when I finished my graduate work.

As applied plant ecology is essentially synonymous in my mind with vegetation management, I am more than pleased to be asked to comment on this topic. You and Frank Egler in the first two "'Conversations" have commented on Rachel Carson's *Silent Spring*. Others, also, have done likewise, often from a highly subjective point of view. This topic has been worked over sufficiently thoroughly so that I feel I should devote my limited space in your journal to other topics. In particular, as a member of the University of Arizona Department of Watershed Management, I should like to comment on the topic of *watershed management.*

The whole field of watershed management is one of rapidly growing importance, one that will become increasingly important as our human population and that of most of the world continues to grow. The requirements of an increasing population put an ever-increasing pressure on production or efficient utilization of the natural renewable resources of our watersheds.

Perhaps before I go any further we should define a watershed. Webster's New Collegiate Dictionary definition is brief and explicit: "The whole region or area contributing to the supply of a river or lake." Thus, a watershed is a physiographic unit. That such an area should be defined as a unit results merely from the fact that water runs downhill and, in the absence of factors that counteract gravity, will always run downhill. Yet there is inherent in the very term *watershed* a potential and very often a real misconception of the concept *watershed management.*

I suppose I should not, but nonetheless I do continue to wonder at the number of scientists who---without much thought—take it for granted that management of a watershed automatically implies management as a means of affecting the water of that area. I would make the point that this management may not be designed to affect the water resource in any degree. True, most of the management practices that may be applied on a watershed will affect the water of the area in some way, but these effects may be merely incidental to the principal reasons for the management program.

Let me enlarge by giving my concept of watershed management. It might be argued that a physiographic unit cannot be managed, but that the resources of such an area can be. For present purposes I shall disregard minerals, which are largely non-renewable, and talk only about the renewable natural resources. On most wildland watersheds these would seem to me to be vegetation, animal-life, water, and recreation. The behavior of the water usually depends largely on how we manage the vegetation. How we manage the vegetation often depends on how we manage the animal-life, including both native or introduced wild animals and domestic livestock. So, perhaps merely to have some point from which to develop an idea, I propose that in actuality we manage the natural resources of a watershed and that in managing these we effect some degree of control over a physiographic unit but that we do not manage the unit as such.

Thus, the timber resource of a watershed is managed by the adoption of proper cutting practices, the forage resources by the application of sound grazing practices, the game resource by the use of wise harvesting, and the recreation resource by these and many other means. Finally, the water (and other) resources of a watershed may be affected by management of any of its other resources. I have not forgotten the engineers; they have their water-affecting techniques also.

In summary then, where do we stand? *First,* watershed management is not synonymous with management of water on a watershed. *Second,* perhaps we do not manage watersheds at all but only the natural (primarily renewable) resources of a watershed. *Third,* by the management of one resource we may affect or indirectly manage another.

On a quite different tack, may I suggest that ecologists are in a better position than the devotees of many other disciplines—assuming that ecology is a discipline—to develop classification tools that are useful in vegetation management? I am thinking here of the classification of range lands on a basis of *condition.* Range survey techniques were revolutionized some twenty-five years ago when the emphasis was shifted from classifying range vegetation as a static entity to a recognition that the vegetation (and erosion) on a site could be used as a means of determining the condition of that site. The idea itself, of course, was not novel. Sampson, Clements, and others had been talking and writing about it for a long time. The new feature lay in a shift of emphasis to the application of ecological—primarily successional—principles to the management of range lands

and the development of specific range-conditions-rating techniques.

As with the development of concepts and techniques generally, this one went through a formative period during which there were minor modifications in some of its features. Although emphasis had always been on maximum forage production as a basis for defining condition classes, there was some difference of opinion on the degree to which successional stages should indicate condition, that is the extent to which the initial stages in a sere should be accepted as representing the poorer condition classes, grading upward to a climax synonymous with excellent condition.

The need for a practical classification that would indicate relative production has continually argued against so high a degree of correlation between pure ecology and its practical application. As a consequence, although it is recognized today that in general there is a correlation between successional stages and condition classes, many exceptions are recognized. Ranges that once supported perennial grasses but that today are characterized largely by annual species, as in the foothill ranges of California, may be classified as in good or excellent condition on a basis of present-as-related-to-potential production. Or ranges such as the desert grassland of the Southwest that once supported a subclimax of perennial grasses under a regime of periodic fires, but that today more often support the climatic climax of trees and shrubs with a relatively sparse understory of grasses, are classified as in fair or poor condition. These kinds of application seem to me to represent a flexibility in the application of ecology which is highly desirable. This lack of rigidity permits a more extensive use of ecology to further the management of our renewable resources.

Land management out here in Arizona, as in many places, is taking the form of millions of dollars being spent in an attempt to undo the effects of many years of man's mismanagement of these lands. Ignorance and cupidity make a bad team, and most of our land problems out here have resulted from these. Invasion of thousands upon thousands of acres of former grasslands by mesquite, and the addition of other thousands that have been similarly invaded by juniper, could have been avoided had there been adequate cognizance of the changes which were taking place and the reasons for these changes. Man, in his all-seeing wisdom, saw fit to check the fires which, as a natural part of the environment, had kept these trees in check. As a clincher he stocked the ranges with many more livestock than they could safely carry. The rest is history, written in terms of grasses replaced by woody "weeds," of drastically reduced carrying capacities, of unnecessary erosion and silt-filled reservoirs, of reduced soil-moisture infiltration, and finally of the expenditure of millions of dollars in an attempt to begin to undo some of these results of ignorance and cupidity.

Well, Pierre, maybe I have said enough. In Mexico they have a saying—*"En boca cerrada no entran moscas."* Your "Conversation" will elicit many responses, some profound, some "down to earth, earthy," and some neither. I do not aspire to the first; I do hope my few comments are not relegated by too many to the last.

Sincerely yours,

R. R. Humphrey

EUGENE JABLONSKI RETURNS TO BOTANY

Floris Jablonski, high school teacher of natural sciences, frequently took his young son Eugene on weekend botanical trips. By the time Eugene entered high school, he knew the native plants of his homeland, Poland, by their Latin names. As years passed, he became completely absorbed in botany and soon found the Hungarian Science University in Budapest inadequate for the pursuit of his scientific ambitions. He transferred to the University of Breslau where Prof. F. Pax was then one of Germany's notable botanists.

When Prof. A. Engler of Berlin asked Prof. Pax to recommend a botanist who would be able to work on the *Euphorbiaceae-Bridelieae for Pflanzenreich,* Prof. Pax sent Eugene Jablonski, who completed the studies on this group of plants. These were later published by the Academy of Science in the collective volumes of Engler's *Pflanzenreich.* The text was in German, the descriptions of the species in Latin. Many new species were named and described by Jablonski. The illustrations were also from his pen.

On completion of this assignment Jablonski returned to Budapest and specialized in paleobotany and tertiary geology. In 1914, a month before World War I broke out, he obtained his doctorate—with botany as the major and geology as the secondary subject.

Well-preserved plant fragments were discovered in the Miocene volcanic tuff deposits at Tarnoc in northern Hungary. Dr. Jablonski was asked to investigate the area and succeeded in identifying many of the plant species. The results were published in 1915 in the annals of the Hungarian Geological Survey as *Die Mediterrane Flora von Tarnoc.*

These publications established his name in the field of botany, and later at twenty-eight years of age he was offered a professorship at two universities. But the laboratory work bored him. His love for the open spaces sent him into the field, and he joined a geological expedition conducted by Dr. E. Vadasz in southern Hungary. Many of Dr. Vadasz's ideas influenced later surveys made by Dr. Jablonski.

When Dr. Vadasz and his survey party returned from the area remote from civilization, they found the world at war. Because of their odd-appearing equipment, the local

people took them to be Serbian spies, and the Hungarian gendarmes delivered them into the hands of the military authorities. Dr. Jablonski was drafted and sent to Tirol for two weeks of training, then to the Russian front. During the Austrian debacle in Podolia on September 13, 1915, his division was captured. As a prisoner of war, he was sent to the camp of Carizyn (later Stalingrad and now, after de-Stalinization, Volgograd) on the Volga.

While he was confined to the prison camp, Mary Krcmery, whom he had met at the Hungarian Science University in 1910, was able to send him Consulate packages. Among them were books on geology, which Dr. Jablonski studied from cover to cover. Not many years afterwards, the secondary subject of his student days became his means of livelihood.

In 1918, in the midst of the confusion of the Communist establishment, after the Russian Revolution, Dr. Jablonski escaped from prison and returned to Hungary which, by a coup d'état, became a Communist country. And there, after nine years of acquaintance, of working together and courting, Eugene Jablonski and Mary Krcmery were married on April 5, 1919, in the Communist manner at the courthouse in Budapest. After they had been declared man and wife, they merely shook hands on the street corners, Mary going to the Commerce School where she was a teacher, Eugene to the herbarium of the National Museum. Eight days later, when two rooms and bath were available to them in the home of Eugene's uncle (who had fled the country in fear of his life), they had a church ceremony.

Shortly thereafter the Jablonskis went to Poland where Dr. Jablonski joined the Geological Survey and engaged in scientific research for the Polish Government. Mrs. Jablonski accompanied him on his trips to the war-ravaged Carpathian Mountains. But conditions became such that the government could not continue to pay for scientific investigations, and Dr. Jablonski found it necessary to seek work in the commercial coal and oil fields. He became geologist at the Galicia Oil Co., then was invited to join the Vacuum Oil Co., which in those days was looking for oil in Poland, Roumania, Germany, and elsewhere. (In 1925, Dr. Jablonski's research on a part of the Polish Carpathians was published in Polish and French; it was this publication that drew the attention of the Vacuum Oil Co.)

In 1926 he was called to New York for a conference, at which he presented a clear explanation of the European situation and discouraged oil drilling in Poland, and was offered a position in Texas. A year later, Dr. and Mrs. Jablonski with their six-year old daughter Wanda came to America, and he went to work in Texas under Socony Vacuum's chief geologist. Slowly, but gradually, Dr. Jablonski built a reputation here in this country and was then sent on many assignments to different countries. In 1930 he was a member of a joint expedition with geologists of the Standard Oil Co. of California, which was sent to Australia, New Zealand, and Tasmania to appraise oil possibilities. During 1932-1934 he remained in New Zealand, in charge of work there, at the invitation of the New Zealand Government.

The years 1934-1938 were spent in Europe—in Austria, Poland, Roumania, and elsewhere, and in Egypt. Mrs. Jablonski says ". . . the year in Egypt was thrilling. We lived in Zamalik, Cairo's European section, in an English pension which had a beautiful view of the gardens and the Nile, and were only a few miles from the Sphinx and Pyramids.

"The nicest Christmas present from my husband in 1936 was a trip to Palestine. We spent Christmas night in Bethlehem. Never will I forget Christmas night in Bethlehem! There were so many pilgrims from all over the world that it was necessary to hold hands and form a human chain so as not to get lost.

"With two cars we crossed the Eastern Desert, the Suez Canal, the Sinai Desert, and the Negev to Jerusalem. It was a geological trip which enabled us to spend fifteen nights in the desert—with very little comfort . . ."

In 1938 Dr. Jablonski was recalled to New York and appointed Chief Geologist of Socony Vacuum Oil Co. Mrs. Jablonski and Wanda returned to this country after Wanda's examinations, as she was preparing at London University for Cambridge-Oxford matriculation. Wanda, however, entered Cornell University, did graduate work in public law at Columbia, and earned a reputation as an outstanding reporter and editor in the petroleum field. She now publishes and edits *Petroleum Intelligence Weekly,* which she established in 1961. It would seem that some of the father's interest in oil had been passed on to the daughter.

Between 1939 and 1953, Dr. Jablonski visited Venezuela twenty-nine times, Colombia fifteen times, and Ecuador, Peru, and Argentina several times each. He also made trips to Saudi Arabia, Egypt, Iraq, Libya, Turkey, Lebanon, and to the Canadian Arctics and Alaska. During these years he was advanced to Manager, then Coordinator of Exploration.

On his many trips a rich collection of ethnographic importance was gathered. It is now housed in six rooms in Cabrini College, Radnor, Pennsylvania, as the "Jablonski Collection." The articles were assembled with the understanding eye of a teacher for educational purposes—all very beautiful inlaid pieces of ebony, ivory, and mother-of-pearl; the Egyptian lotus and scarab; and a large representation of New Zealand, Turkish, Portugese, and central European folk art.

In 1957 Dr. Jablonski retired after thirty-three years of service with the company now known as Socony Mobil Oil Company. Shortly thereafter he packed his rich geological library and shipped it in twenty-six army trunks to three bombed-out universities in Europe. He filled the empty shelves with books on botany, and now works early and late—not that it is work to Dr. Jablonski, for he thoroughly enjoys being a botanist again.

That was a joyous day when he attended a meeting at The New York Botanical Garden at which the *Euphorbiaceae* was mentioned. He introduced himself to the speaker who asked, "Are you *the* Dr. Jablonski who wrote a volume on the *Euphorbiaceae in Pflanzenreich?*" "I am," he replied and was promptly invited to return to botany as Honorary Curator of Tropical Botany at The New York Botanical Garden. He has completed a revision of part of the euphorbiaceous genus *Trigonostemon,* largely of Malaysian distribution (the materials were made available for this study by Singapore Botanical Gardens), and is now working on the South American genera of the family. He has completed the chapter on the *Euphorbiaceae for the Traité de Paleobotanique* to be published in Paris.

BROMELIADS

By WALTER SINGER

Mr. Singer is Staff Photographer of The New York Botanical Garden. In previous issues of *The Garden Journal,* he has discussed the historical background and the culture of bromeliads, a group of plants with which he has had considerable experience.

THE BOTANICAL SYSTEM of classification places the Bromeliad Family in the division of flowering plants. The family has three subfamilies: 1) *Pitcairnioideae,* 2) *Tillandsioideae,* and 3) *Bromelioideae.*

According to their decorative values bromeliads are classified: 1) for their brilliant flowers and 2) for their beautiful foliage.

According to their growing habits and culture bromeliads are: 1) epiphytic, 2) terrestrial, and 3) saxicolous. A selection of bromeliads is here presented in alphabetical order, with brief descriptions of their individual characteristics, and a code is given to furnish some cultural hints for the beginner. The year, in parenthesis after the botanical name, indicates the time of discovery or introduction.

L	Light; place in a light window but not in direct sun.
DL	Direct sunlight; place in a south window, as much light as possible.
SH	Shade; place in partial shade, but not in almost complete shade.
ME	Use potting mixture for epiphytic bromeliads.*
MT	Use potting mixture for terrestrial bromeliads.*
MS	Use potting mixture for saxicolous or desert bromeliads.*
FL	Outstanding for brilliant flowers.
FO	Outstanding for beautiful foliage.
FR	Outstanding for fruit—berries or colorful seeds.

Acanthostachys strobilacea (1844). While this species, which is native to Argentina, Brazil, and Paraguay, may not be a good commercial plant, it is well suited for growing in baskets. The leaves are drooping, relatively long and narrow, and have a sharp edge. The bracts are carrot-red, the flowers a light greenish yellow. The small fruit is attractive, resembling that of *Ananas comosus,* the pineapple, in color and shape but much smaller in size. DL - ME - FR.

The most widely cultivated genus in the Bromeliad Family is *Aechmea,* no doubt because the inflorescence of many of its species lasts for weeks or months.

Aechmea bracteata (1844). This large and strong-growing species from Central America may be saxicolous, terrestrial, or epiphytic. A tight cylindrical vase of bright green leaves with large marginal teeth holds the branched inflorescence. The scape-bracts are brilliant rose-red; the flowers greenish yellow. *A. bracteata* can stand light frost, so is good for outdoor planting. DL - MT - FL.

Aechmea bromeliifolia. A saxicolous bromeliad from Brazil, with attractive foliage which is especially prominent in the variety *A. bromeliifolia rubra.* It is a plant of medium size, well-suited for indoor culture. DL-MS - FO.

Aechmea calyculata. An epiphytic bromeliad in the rainforests of Brazil and Argentina. Its dense, globular, scarlet-red inflorescence, with yellow flowers, stands above a rather loose rosette of stiff, deep green leaves. L - ME - FL.

Aechmea caudata variegata. Native in the costal forests of southern Brazil, this bromeliad produces a bright yellow inflorescence with yellow bracts and flowers. It excels in foliage beauty—the leaves are broadly lengthwise-banded with cream-yellow on the deep green base. Good lighting brings out rose hues on young leaves. L - ME - FO.

Aechmea chantinii. An epiphytic bromeliad from the forests of Venezuela, Brazil, Ecuador, and other parts of South America. Undoubtedly the most attractive of the genus, it is still somewhat rare in the United States, but has been in cultivation for more than half a century in Europe. The leaves are olive or dark green with distinct silver-white crossbands. The inflorescence is erect and branched, with bright salmon-red bracts blending into yellow tips. L - ME - FL - FO.

Aechmea coelestis albo-marginata. This Brazilian species, both epiphytic and saxicolous, is a fine large foliage plant. The stiff leaves are broadly margined with creamy white. The branched inflorescence is red, with blue-petaled flowers. L - ME - MS - FL.

Aechmea fasciata (1826). The rose-pink thistle-head-like inflorescence with blue flowers may last six months or more. It blooms in July and August, but the leaves with silvery tiger-bands make *A. fasciata* an attractive plant the year round. It has been cultivated in Europe more than any other bromeliad, and many new strains and forms have originated there, some with marginal bands *(A. fasciata albo-marginata)* or longitudinal stripes *(A. fasciata variegata)* in ivory color. L - ME - FL - FO.

Aechmea fosteriana. Brazil. Grayish green leaves, mottled irregularly with reddish brown, form a cylindrical tubular rosette. The inflorescence, with crimson-red bracts and yellow flowers, is partially nodding. *A. fosteriana* is one of the parents of the hybrid 'Bert'; *A. orlandiana* is the other parent. L - ME - FO.

Aechmea fulgens and *A. fulgens discolor.* These bromeliads from Brazil are both epiphytic and terrestrial. Their triangular cone-shaped inflorescences bear scarlet berries which remain colorful for many weeks. The flower petals of *A. fulgens* are blue; those of *A. fulgens discolor* purple. Both plants bloom in spring. The leaves are grayish, powdery above and maroon to purple beneath. SH - ME - FL.

Aechmea lueddemanniana. (1866). This species is both epiphytic and terrestrial in central South America. The green leaves are mottled with a darker shade of green. The inflorescence bears white and blue berries which become purple later on. SH - MT - FR.

Aechmea × *maginalis* (1954). A very popular cross between *A. miniata discolor* and *A. fulgens discolor,* inheriting all the attractive characteristics of its parents. The leaves are glossy, olive-green on the upper surface and maroon on the under side. The inflorescence has salmon-red bracts, blue flowers, and later orange berries. SH - MT - ME - FL - FO.

Aechmea mariae-reginae (1864). The Spanish name of this aechmea is *Flor de Santa Maria;* it is used for holy rites. This terrestrial bromeliad from Costa Rica is a large plant with an erect flower-spike, watermelon-pink bracts, violet flowers, and red berries. L - MT - FL.

Aechmea marmorata (1855). The leaves form a large, tall, tubular vase, hence the popular name of "Grecian vase." The bracts are rose-pink, the flowers blue. *A. marmorata* is from Brazil. L - ME - FO - FL.

Aechmea mertensii (1818). This medium-sized bromeliad from Brazil is both epiphytic and terrestrial. The bright green leaves are margined with dark brown teeth, the inflorescence has red bracts and yellow flowers; the red berries turn into a deep blue. This species is rather rare. L - MT - FL.

Aechmea mexicana. This bromeliad from Central America is both epiphytic and terrestrial. The leaves are mottled with darker green; in

1. *Aechmea chantinii*
2. *Aechmea* × *maginali*
3. *Ananas comosus variegatus*
4. *Billbergia* × *'Fantasia'*
5. *Billbergia nutans*
6. *Billbergia euphemiae*

*See "The Bromeliads," *The Garden Journal,* March-April 1963, p. 59.

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full sunlight they have a red tint. A white fuzzy-stemmed spike with white berries stands well above the large rosette. The flowers are inconspicuous. DL - MT - FL.

Aechmea miniata discolor. This epiphytic, spring-flowering Brazilian bromeliad has glossy, olive-green leaves, maroon on the under side. The erect, branched inflorescence bears orange-red berries tipped with blue flowers. It has been used successfully as a parent for such hybrids as 'Royal Wine' and × *maginalis.* SH ME - FL.

Aechmea nudicaulis (1753). This species is found epiphytic and saxicolous in Central and South America. Green leaves have light brown, prominent, marginal teeth. The inflorescence is brilliant—bright red with yellow flowers. DL MS and ME mixed FL.

Aechmea orlandiana (1939). Both epiphytic and terrestrial, this bromeliad from Brazil has attractive pale green leaves which are decorated with zigzag markings of dark chocolate. White and yellow flowers are borne on an orange-colored flower-spike. L - MT - FO.

Aechmea pectinata (1879). A terrestrial and epiphytic species from Brazil. The inflorescence, resembling the flower-spike of the pineapple, has green flowers. L - MT - FL.

Aechmea penduliflora (1830). This is a medium-sized plant, both epiphytic and terrestrial, from Costa Rica and Brazil. The leaves are dark green, at times blending into maroon. The inflorescence bears white berries which turn into blue. *A. penduliflora* makes a desirable pot plant. L - ME - FO.

Aechmea pineliana (1851). In good light the tooth-edged leaves of this Brazilian species turn rich rose with dark maroon. The inflorescence is striking with its red bracts and yellow flowers. L - ME - FL.

Aechmea racinae. Attached to the pendent inflorescence are orange-red berries and yellow to dark, nearly black flowers which give the inflorescence the appearance of Christmas decorations—hence the name of "Christmas jewels." This Brazilian species is a parent of 'Foster's Favorite', which has dark maroon, glossy leaves. SH - ME - FL.

Aechmae tillandsioides var. *kienastii* (1830). This species from Mexico to Brazil is the "red, white and blue" of the bromeliads, since the bracts are red, the berries white, and the flowers blue. The inflorescence resembles that of a tillandsia. L - ME - FL.

Aechmea weilbachii leodiensis (1887). A long-time favorite because of its colorful bronze foliage and attractive purple inflorescence. SH - ME - FL - FO.

Ananas bracteatus and *A. comosus* are pineapples, both having variegated varieties which should be in every bromeliad collection. Their foliage and their fruit are unsurpassed. Their decorative value lies in the colorful combination of ivory-striped leaves and rose-red overtone on the entire plant, provided it is grown in good sunlight. DL - MT - FO - FR.

The genus *Billbergia* was named in honor of Gustave Johannes Billberg, a Swedish botanist (1772-1844). The billbergias have very colorful, mostly pendent inflorescences; however; the life span of the inflorescense is very short.

Billbergia amoena. This medium-sized, tubular plant from Brazil has pink bracts and green, blue-tipped flowers. There are two varieties somewhat similar to the species: *B. amoena viridis* whose leaves are spotted with ivory, the petals entirely green; and *B. amoena rubra* whose leaves are mottled with white and yellow. L - ME - FL.

Billbergia distachia. An "old timer" from Brazil. Its leaves are green, tinged with purple and a silvery scale overcast. Its pendent inflorescence carries rose-colored bracts and pendulous green flowers tipped with blue. *B. distachia* grows into a clump. The petals of variety *stranssiana* are green only; the leaves of variety *maculata* are ivory-spotted.

Billbergia euphemiae. The stiff leaves of this tubular plant from Brazil are marked with silvery gray crossbands. The bracts are rose-pink, the nodding flowers blue. Variety *purpurea* has reddish purple leaves. L - ME - FL - FO.

Billbergia 'Fantasia' (1942). A hybrid *(B. saundersii* × *B. pyramidalis)* which has become a very successful plant, commercially. The broad green leaves are marked with ivory, green, or rose blotches. The inflorescence is pendent, has scarlet bracts, and blue flowers. L - ME - FO - FL.

Billbergia horrida (1856). The large spiny teeth on the edge of the gray-banded, green leaves are responsible for the specific name. *B. horrida,* from Brazil, carries an upright inflorescence with red bracts and blue flowers; the stiff bronze leaves are marked with silver crossbands. It is one of the parents of 'Muriel Waterman', a very attractive hybrid. *B. horrida tigrina* has fragrant, green flowers and maroon-brown leaves with silver-gray bands.

Billbergia iridifolia concolor. The curled, silver-gray leaves make up for the medium-sized, tubular rosette. The inflorescence has pale pink bracts and yellow flowers. L - ME - FL.

Billbergia leptopoda. Often called the "permanent wave" plant, because its short, tubular leaves curl back at the ends. They are green, marked with white blotches, and the surface has a silvery gray, scaly overcast. The plant seldom grows taller than twelve inches. The flower-spike is colorful, with rose-red bracts and yellowish green flowers tipped with blue. L - ME - FL.

Billbergia 'Muriel Waterman'. The plant combines the beauty of *B. horrida tigrina* with the attractive characteristics of *B. euphemiae purpurea.* The inflorescence is semi-nodding, the bracts rose-pink, the flowers a greenish steel-blue. The leaves are a deep reddish plum-purple, decorated with silver-gray bands and have prominent teeth along the margin. L - ME - FL.

Billbergia nutans. This is an epiphytic bromeliad from Brazil, Uruguay, and Argentina, which has been cultivated, especially in California, for a number of years. The narrow, sword-shaped leaves are tinged with bronze and have a gray scale overcast. Sunlight will change the color of the leaves from olive-green to a rosy bronze. The nodding inflorescence has rose-pink bracts with pendent flowers—"queen's tears," they are called. They are green, tipped with violet-blue. *B. nutans* blooms in winter and is therefore well suited for dish gardens and Christmas arrangements.

Billbergia porteana (1857). A robust, tall, tubular plant, with grayish green, mottled leaves. The pendent flower-stem arches over to one side so that its tip nearly touches the ground. The bracts are brilliant rose-red, the flowers green.

Billbergia pyramidalis concolor. From Brazil. The very showy inflorescence accounts for its popularity in landscape work in Florida. The broad, glossy, yellowish or apple-green leaves form a fine vase from which rises the large flower-heads with red bracts and crimson-red flowers tinged purplish. The fairly new variety, *B. pyramidalis striata,* has light bluish green, tomentose leaves with cream-white stripes. SL - MT - ME - FL.

Billbergia saundersii. This native to Bahia is a medium-sized plant with few but colorful leaves forming a tight vase. The stiff, olive-green leaves assume a bronze hue in good light and show ivory and pink blotches. The nodding inflorescence has brilliant red bracts and blue flowers. L - MF - FO - FL.

Billbergia vittata (1848). From Brazil. The olive-green leaves, often turning to purplish brown, have irregular silver crossbands and are covered with a gray scaly overcast. The inflorescence is arching, has brilliant scarlet bracts, deep bluish purple flowers, and prominent yellow stamens. It is easily grown in clusters as a specimen plant. L - ME - FO - FL.

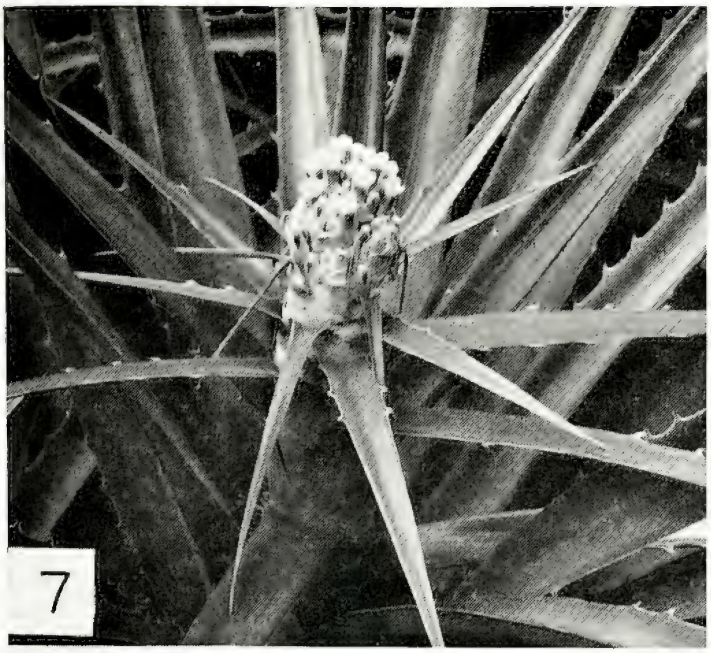
Billbergia zebrina. An epiphytic bromeliad from Brazil, this has striking foliage—its leathery, purplish green leaves are decorated with silvery white crossbands. L - ME - FO - FL.

The genus *Bromelia* as well as the family *Bromeliaceae* was named in honor of Olaf Bromel, the Swedish botanist (1639-1705). The species are large plants, used mostly in landscape work or as hedge plants to keep out intruders, since their long, straplike, leathery leaves are margined with ferocious-looking hooks.

Bromelia balansae. This species produces a very spectacular inflorescence, the white flowers sitting in a tight, compact panicle. The chief attraction, however, is the "heart of flame" red center which appears before the plant sends up its erect inflorescence. The center of the leaf rosette turns into a flaming red—a beautiful sight every year. The yellow fruits are tasty, similar to the pineapple once the spiney hooks are passed. DL - MT - FL.

Cryptanthus (1827) is sometimes referred to as the genus of the "earth stars." They are found mostly as flat leaf rosettes on the ground

7. *Bromelia balansae*
8. *Cryptanthus bromelioides tricolor*
9. *Cryptanthus zonatus*
10. *Dyckia brevifolia*
11. *Dyckia fosteriana*
12. *Fosterella penduliflora*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of central Brazil forests, growing in shade or in full sun. Many cryptanthus are excellent subjects for dish gardens and terrariums.

Cryptanthus acaulis. The flat rosette of grayish green leaves has a slight scale overcast. The small flowers are white at the center; so are the flowers of *C. acaulis ruber* whose leaves are a purplish brown. L - MT - FO.

Cryptanthus beuckeri. Its thin spoon-shaped leaves come to a slender point; they are a rich green marbled irregularly with dark green. The flowers are whitish. L - MT - FO.

Cryptanthus bivittatus minor. This well-known plant is often used in dish gardens, terrariums, and novelty planters. In the trade it is sold under the incorrect name of *C. roseus-pictus.* This name partly describes its beautiful leaves which have pink-rose, coppery bronze, and two pale olive-green bands on the upper surface and are reddish brown beneath with a dense scaly overcast. The leaf margins are wavy and finely toothed. This small terrestrial rosette has a "double" in *bivittatus lueddemanii,* which is almost the same in coloring, perhaps a little greener on the upper surface. However, the leaves are longer and flatter. Both these species have white flowers. SH - MT - FO.

Cryptanthus bromelioides (1831). From Brazil. It is probably the tallest of the genus *Cryptanthus.* For many years it was known as *C. terminalis,* a name which is still used commercially. The long. wavy, very pointed leaves form a loose rosette at the end of long stems. The color becomes brilliant bronze-copper-red in good light, while it is a dull green in shade. The flowers are white. This bromeliad is very easily propagated, is also easily grown, and will add beauty to any plant arrangement. L - MT - FO.

Cryptanthus bromelioides tricolor. A very colorful variegated form of the above species. The leaves are striped and lined lengthwise with ivory-white, rose-red, and olive-green, and the entire leaf-blade appears tinted a rosy pink under proper light conditions. Some growers have applied names, such as 'Rainbow Star', to indicate the striking coloration. L - MT - FO.

Cryptanthus lacerdae. The "silver star" of the cryptanthus comes from Brazil. Its green leaves have a broad silver stripe through the center and broad, finely-toothed, silver margins. The small wavy rosette is very attractive. The flowers are white. SH - MT - FO.

Cryptanthus × osyanus (C. beuckeri × C. acaulis ruber). This is a colorful hybrid which shows traces of petioled leaves as in *C. beuckeri.* The mottled reddish brown coloring may fade in strong sunlight. The flowers are white. SH - MT - FO.

Cryptanthus zonatus. This Brazilian species first appeared in cultivation in Paris in 1842. It is known as the "zebra plant" or "star plant" because of its golden or silver-beige, irregular crossbands which brought the additional name of *zebrinus* to the species. The plants under the names of *C. zonatus, C. zonatus zebrinus,* and *C. fosterianus* are very similar in appearance, with relatively minor differentiations; but to the bromeliad fancier and collector each one of the three is beautiful and valuable. The large, low rosettes have wavy, coppery or purplish brown leaves with crossbands as described above. The white flowers are sessile in the leaf-axils. L - MT - FO.

Cryptbergia is a bigeneric hybrid of *Cryptanthus* and *Billbergia.* Two hybrids have established themselves very well: *Cryptbergia × meadii (Cryptanthus beuckeri* and *Billbergia nutans)* is the older. The medium-sized plant has rose-tinted, light green leaves, narrow and pointed; they are mottled with darker green or brown above and are very scaly gray beneath. The flowers, grayish green, are often in dense clusters. L - MT - FO.

Cryptbergia × rubra is a bigeneric hybrid with *Cryptbanthus bahianus* and *Billbergia nutans* as parents. The small, stiff rosette has glossy, deep maroon leaves with small, sharp teeth along their margins. The flowers are whitish green. L - MT - FO.

The genus *Dyckia* was named in honor of the German patron of botany, Prince Joseph von Salm-Reifferscheid-Dyck (1773-1861). Most of its species are sun-loving. They have small, dense rosettes with stiff, leathery leaves, often well-armored with spines, and are well suited for landscape work in southern parts of the United States.

Dyckia brevifolia. This Brazilian species is always sold as a filler for cacti and succulent dish gardens. The stiff, succulent leaves are glossy, deep green above and silvery green with very fine lines beneath. The plant clusters freely. The inflorescence leans to the side and rises far above the dense rosette. Its flowers are brilliant sulphur-yellow to orange, the color being reflected in its former name *D. sulphurea.* SL - MS - FL - FO.

Dyckia fosteriana. This bromeliad from Brazil has a very decorative rosette of recurved, silvery purple leaves which have a very prominent saw-toothed edge. The tall inflorescence bears orange flowers. SL - MS - FO.

Dyckia rariflora. Another Brazilian species. It forms a small rosette of stiff, leathery, and pointed leaves which have dark, nearly black spines along the margins. The flowers, bright orange, are borne on a very long stem. SL - MS - FO

THE TULIP **(Continued from page 83)**

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A garden is the mirror of a mind. It is a place of life, a new story of green moving to the pulse of the year, and pressing on and pausing the while to its own inherent rhythms. In making a garden, there is something to be sought and something to be found. To be sought is a sense of the lovely and assured, of garden permanence and order, of human association and human meaning; to be found is beauty and that unfolding content and occupation which is one of the lamps of peace.

HENRY BESTON in *Herbs and the Earth*

SOME ALGAE OF SOUTHERN CALIFORNIA

By JENNIE L. S. SIMPSON

Dr. Simpson, Professor Emeritus of Biological Sciences, Hunter College, New York, is enjoying her retirement in southern California during part of the year and at her home in Waterloo, Quebec, Canada, in the summer and fall months.

AS A NEWCOMER who has taken a mere sampling of algae from the southernmost twenty-five miles of the California coast, I have been delighted to find them so abundant and varied, even in the winter months.

La Jolla is an acknowledged beauty spot or "jewel" of the Pacific Coast. Its rocky promontory has been eroded according to the resistance of its various parts to the action of the waves, so that one finds a series of beaches, separated by boulder-like masses, with occasional arches and caves. There are stretches where the surf is unbroken by obstacles, others where outer rock masses guard sheltered pools. A man-made breakwater, reefs on a series of rock levels beset with tidepools of many sizes, shapes, and depths, a sheltered bathing beach, Scripps' pier—all these furnish a variety of habitats where the algae of the region have become established. This is my favorite collecting ground, especially when the reefs are left exposed by the spring tides. One can observe each plant attached and alive.

Many of the most interesting forms, however, are in the infratidal zone. Without a dredging boat, one can only collect them when they are torn loose and deposited upon the beaches, in great piles of drift.

At Imperial Beach, not far from the Mexican border, one may or may not be lucky. Walking the dog along the sandy stretches, in more than a dozen visits I made only two really good collections. These, however, worked over and mounted, added a great deal to the picture of algae in these waters.

In general terms, one thinks of the larger brown algae as characteristic of the colder oceans. It is true that they are not to be found here in great numbers, but they have interesting representatives.

Macrocystis pyrifera, normally attached to rocks at a depth of twenty meters, is found cast up on all the beaches. It is known to have the widest distribution of all the kelps and is an important plant here, harvested along these coasts for the production of algin.

More interesting, because of its limited range, is another deep water form, *Pelagophychus porra,* the elk kelp, found only from Point Conception along the coast of southern California into Mexican waters. In having a single large pneumatocyst (air sac) and a long stipe, it greatly resembles the more northern genus *Nereocystis,* but the branching of its stipe and blades is different. The first forking is indeed reminiscent of an elk's horns. Many specimens, of varying size, are cast up on the beaches. I have found only one small enough to press.

In one of the sheltered pools behind rocks on a surf-beaten stretch at La Jolla, I came upon an interesting association of brown algae. Attached and half-exposed at low tide were numerous plants of *Egregia laevigata, Eisenia arborea,* and *Cystoseira osmundacea.* The latter ranges from northern Oregon to lower California; the two other species are of more local distribution. *Egregia menziesii* is the more northern species of that genus. Just above them on the exposed rocks, *Pelvetia fastigiata* was abundant, while *Ralfsia pacifica* made black patches on the larger stones. *Colpomenia sinuosa* in many sizes, lay scattered over the reef. *Sargassum agardhianum* was in the same association, well established in the sand, its narrow branches crowded with vesicles and short, firm blades.

It is interesting that *Fucus* is not found below central California. The Fucales are here represented by *Pelvetia fastigiata, Hesperophychus harveyanus, Halidrys dioica,* two species of *Cystoseira,* and two of *Sargassum.* I have found *Sargassum palmeri,* characterized by divided blades, in drift at Imperial Beach.

I am not surprised to find the Dictyotales represented

Dictyopteris zonariodes left, and *Zonaria farlowii,* below, in a tidepool at La Jolla, California.

here by a reported five species. Early in March, 1962, I was attracted to a tidepool by an iridescence and found there *Dictyopteris zonarioides* and *Zonaria farlowii* growing together rather luxuriantly. The zonaria had well-developed patches of aplanospores (non-motile cells detached for propagation) These two are southern Californian species.

The cliffs at La Jolla command a magnificent view of the Pacific Ocean. People walk there with binoculars and with cameras, to watch for the migrating whales, to admire the sea lions, to study the water birds, sometimes to paint. At intervals, one finds a little shelter where one may sit or eat lunch. Nearby, a path or flight of steps facilitates progress to the beach below. From one of these eminences, on a beautiful January day, I took two kodachromes and later projected them for the comments of a friend. "I like some life in a picture," she said, "therefore I prefer the one which shows the gulls feeding." To a biologist, the picture is one of abundant life, an awe-inspiring number of life patterns, at many evolutionary levels. One is astonished that so many representatives of the different orders and divisions are present in so small an area. How unbelievably great are the numbers of spores produced by a single delicate red alga! Even in the winter months, many are found in reproductive stages. The exposed reefs at low tide are beautiful in their blend of colors. One goes down to take a closer look, to account for the effect.

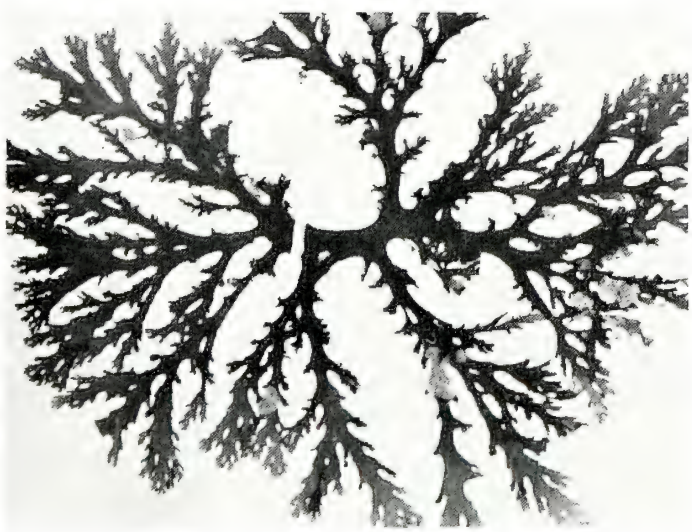
The spray zone, on the vertical rocks, is generally green, thick with *Chaetomorpha, Enteromorpha,* and small *Ulva.* Below these are small, matted purplish and brownish reds, such as *Lophosiphonia villum,* some species of *Polysiphonia,* and *Spermothamnion snyderae.* At the base of the cliff is abundant, dark purplish *Cumagloia andersonii,* each axis densely covered with short branchlets. On the tops of larger rocks, the spherical individual plants of *Endocladia muricata* are grouped like miniature tumbleweeds. *Hesperophychus* may cover another boulder top, with *Pelvetia* nearby. A mossy mass of algae covers the exposed reef, with frequent aggregations of pearly shell fragments, each marking the location of a sea anemone. In and around the tidepools, abundant *Plocamium* (two species) contributes rosy red shades, while *Gelidium* and *Gigartina* furnish a dark background. Coralline algae are abundant, in soft pinks. I have

Acrsorium uncinatum, ephiphytic on other algae, in tidepools at La Jolla, Coronado, and other places in southern California.

collected three species of *Corallina,* also *Bossea,* and *Jania.* Two species of *Laurencia* were found nearby, and the deep red *Rhodymenia pacifica.* In the larger tidepools, small specimens of *Pterygophora californica* and other kelps, mentioned above, occur. On outer rocks, long strands of the surf grass *Phyllospadix* make a green covering.

My two best collections of detached algae were made at Imperial Beach on January 30, 1962, and December 10, 1962. They include some of the delicate and beautiful

Callophyllis marginifructa, with marginal cystocarps, cast ashore at Imperial Beach.



Coralline algae are abundant at La Jolla. Below is *Corallina chilensis*

Stenogramma californica, cast ashore at Imperial Beach. The interrupted lines show the position of embedded carposporangia.

Rhodophyceae which grow in deep water. Among these, the *Delesseriaceae* are best represented by *Phycodrys setchellii, Polyneura latissima, Botryoglossum farlowianum, Acrosorium uncinatum,* and *Nienburgia andersoniana. Acrosorium uncinatum* is especially characteristic of southern and lower California as an epiphyte on other algae. It was found in some of the tidepools and was present in practically all collections of drift. I also saw it on fish lines on the pier at Oceanside. It is attractive in its purplish red color, its microscopic veins, and its general delicacy.

Other interesting and colorful specimens were: *Pikea californica* and *Leptocladia binghamiae* of the *Dumontiaceae, Halymenia californica* of the *Grateloupiaceae,* forming tetraspores, *Callophyllis marginifructa* and *Callophyllis obtusifolia* of the *Callymeniaceae,* and *Stenogramma californica* of the *Phyllophoraceae,* both tetrasporic and cystocarpic plants.

Specimens collected from drift are often fragmentary and thus disappointing. I hope to obtain complete plants eventually. Even the fragments, however, reveal facts about texture, color, and structure of both vegetative and reproductive stages.

Much remains on the beaches to be discovered and appreciated. This account, as I have said above, is of a sampling.

CLUB-MOSSES — THEN AND NOW

By Lucia M. Andrews

Mrs. Andrews was a student in Botany I and II at The New York Botanical Garden under Dr. H. W. Rickett several years ago; took further courses in the Garden's Educational program, and then continued her studies, receiving a Master's degree from Columbia University under Dr. Bassett Maguire. She is presently a volunteer in the herbarium, assisting Dr. Caroline Allen with the *Lauraceae.*

OFTEN THE INSIGNIFICANT green plants that grow near the surface of the ground in woodland or field have an unseen beauty and interest all their own. Of these the club-mosses, called also ground-pines or running-pines, especially deserve our notice. They are small plants, six to eight inches high, and their upright stems covered with needle-like leaves make them look like tiny evergreens.

However, their common names are misnomers and should not be used without an explanation. Club-mosses are not mosses at all, neither are they remotely related to pines or spruces. Their proper name is *Lycopodium,* and their ancient lineage is proven by fossils of their ancestors found in Devonian rocks laid down 350 million years ago. A whole division of the plant kingdom—the Lycopsida—has been named for them and includes two other living families and several fossil groups.

Distinguished lycopod relatives of the Carboniferous period were giant trees, a hundred feet high—the genus *Lepidodendron*—which flourished in the teeming swamps of a hot and humid climate and became an element in our coal deposits. The trunk of these trees was a straight shaft which did not branch until some distance above the ground: then it formed a thick, bushy crown by branching dichotomously—that is, each branch divided again and again in even two's, like the forking of a road. The smaller branches were clothed with closely set, spirally arranged, long, narrow leaves. When these leaves ripened and dropped from the stem, each left a diamond-shaped scar, so that the fossil trunks are decorated with a regular spiral network. Like the club-mosses of today, these ancient trees reproduced by spores carried in cones on the ends of branches. Seeds, a more advanced method of reproduction, had not yet developed in evolution.

It was believed for a time that the present little lycopodiums were the degenerate relics of tall lepidodendrons, but that theory has been abandoned. They are now known to have lived side by side for millions of years. The great trees, for all their apparent strength, could not adapt themselves to the unfavorable climatic conditions of the Permian period; they died and were buried. Their insignificant cousins, the club-mosses, left offspring adjusted to the changing environment and in their unassuming way survived through the ages.

All the lycopods are "microphyllous." That is a big word for small leaves, but it signifies not only size but a very simple construction, different from that of the leaves of most of our familiar plants. One unbranched conducting strand (xylem and phloem) connects the leaf with the main vascular system, and there are no leaf gaps left in the vascular strand of the branch where strands pass out into the leaves. The anatomy of the vascular strands, the simple dichotomous branching of the plant, and reproduction by spores are three characteristics that emphasize the very early origin of the lycopods.

It is not necessary to travel great distances to find the club-mosses, for they occur over most of the earth; but the

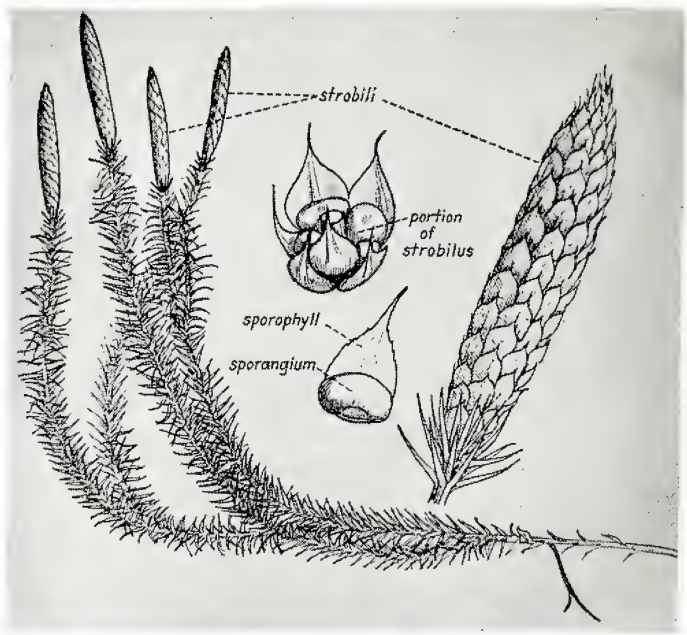
enthusiastic botanist collects pictures when he gathers plants and pays tribute to nature, not only by studying the smallest parts of plants, but by appreciating the environment, by absorbing the landscape in which they grow.

Near Port Antonio in Jamaica is a high hill. To reach the hotel built on an open plateau on top of the hill, one drives or walks up a narrow, winding road. Wherever there are a few feet of level ground, a native shack is perched precariously over the steep slope. Little children, nearly naked, goats, and chickens play with perfect confidence on the slippery dirt trails of the hillside. From the road one can almost touch the tops of tall trees, whose trunks extend downward to the roots far below. The inn, on the flat summit, commands an unlimited view in all directions. It is a cyclorama canopied by the blue dome of the sky: aquamarine sea dotted with green islands; distant blue-gray mountains, over which purple cloud shadows majestically parade; rounded green hills in the nearer foreground, touched with color of flame-flowering trees, red roofs, and white houses. One can see glimpses of light green valleys and an occasional curve of a brown road.

In such surroundings a botanist must literally come back to earth to find the humble club-moss sprawling on a roadside bank. This Jamaican lycopod, one of many tropical forms, is *Lycopodium cernuum.* It has leafy prostrate stems which arch and root at intervals, and small single cones on the tips of its upright branches.

On the eastern seaboard of the United States, anyone walking a woodland trail in areas where the soil is acid is apt to find several species of club-moss. Such a trail in the Adirondacks followed the southern boundary of an old plantation of spruce and pine trees. The air was clear and fresh, and the summer sunshine made it pungent with the fragrance of the evergreens. To the right of the path a section which had been burnt over years before had not been reforested, and wild raspberries, bracken, and goldenrod made a disorderly tangle among clumps of shrubby cherries and maple saplings. Thick under the edge of the evergreen planting, spreading a little into the more open spaces, was a vigorous growth of *Lycopodium annotinum,* the running-pine. Long leafy stems were lying on the ground surface, anchored by roots which thrust into the soil for water and nutrients. Straight finger-like branches stood upright and close together. Many of the erect growths had single cones, or strobili, on their tips. The cones consist of leaves called sporophylls, so shaped that they protect the spore cases, or sporangia. The wide base of each sporophyll folds over a kidney-shaped spore case. The pointed top of each is pressed tightly against the axis of the stem and overlaps the sporophyll above it. Since the cone leaves contain much less chlorophyll than the stem leaves, the cones are light green or almost yellow in color.

Lycopodium clavatum is easy to find in the same vicinity, usually in more open and drier locations. It bears its cones, two or three together, on the ends of apparently naked branches, several inches above the rest of the plant. These fruiting branches are not really bare, they have minute leaves widely spaced along their length. This is an arrangement which, by raising the spores into the air, aids their dispersal. Many of the fully clothed leafy branches are divided and are shorter than those of *L. annotinum.*



Lycopodium annotinum, a club-moss, from a drawing by H. W. Rickett in *Botany* by W. J. Robbins and H. W. Rickett.

Common in the Adirondacks, and sharing some of the characters of *L. annotinum,* is *L. obscurum.* This lycopodium looks very much like miniature individual trees. Its leafy parts have branched again and again until they present a bushy, tufted form, but they also have single cones on the ends of the ultimate branches. Their main stem is entirely underground; they do not actually stand alone but are themselves branches of a creeping stem.

The fruiting parts of *L. complanatum* look like many branched candelabra held above another small tree-like form. The common name, ground-cedar, is descriptive, if inaccurate, because the minute leaves are closely appressed and give the branches a smooth, twiggy appearance quite different from that of the ground-pine.

There are two species of *Lycopodium* in New York State that are simpler, more primitive types in which no cone is formed. Their sporangia are borne on the bases of ordinary green leaves. This is interesting from the evolutionary point of view, showing that there is no fundamental distinction between "fertile" leaves, which bear sporangia, and "sterile" leaves, which are solely vegetative. The cone of the more advanced species is a stem with fertile leaves closely crowded on it and is an adaptation which protects the spores.

When growth is completed and the fruit is ripe, the sporophylls spread apart and the kidney-shaped sporangia split open by a slit across their widest part. Under a lens, they look like diminutive golden clam shells somewhat swollen and filled with yellow dust. The dust is the spores, millions of them, ready to be blown away by the slightest current of air. These one-celled particles of living substance, encased in a waxy wall, will germinate into the plant called the gametophyte. This plant is very small, turnip-shaped, mostly subterranean, whose future life depends on a friendly fungus which lives within its developing cells and helps to nourish it. When the male and female elements (gametes) which grow on the gametophytic plant unite and become a new cell, then the new club-moss, spore-bearing plant that we see and know will begin its growth.

Lycopodium obscurum, upper left, *L. complanatum,* upper right, and *L. lucidulum,* lower right, photographed at The New York Botanical Garden.

The yellow spores of *Lycopodium* are filled with oil and burn explosively. In pre-electric years they were used by photographers for flashlights and for melodramatic effects on the theatrical stage. Even today it is standard practice in elementary botany laboratories to touch a match to a pan full of "lycopodium powder." It makes a striking demonstration, one guaranteed to wake up the students!

Scientists are probing the secrets of nature, learning the laws of heredity and growth and the chemistry of the living protoplasm; establishing systems of classification of plants and animals which will express the relationship and evolutionary sequence of species and genera. Most of us, however, can glance only lightly over the volumes of knowledge, but if that glance can open our eyes and sharpen our senses to a deeper appreciation of natural beauty, how rewarding it is! To listen to a symphony with understanding of its chords and motifs; to look at a magnificent view and know something of the forces that formed the mountains, rocks, and valleys; to walk in the woods and to recognize the trees and ferns and little ground plants; to apprehend beauty in the whole and in the parts—this, indeed, is the highest pleasure and fulfillment.

"The wonder of the universe is locked up in a seed, a cutting, or a leaf. If we but watch Nature herself in an endless propagation, we can learn more than books can teach. We cannot 'will' or reason our way into an understanding of the mysterious, pulsing rhythm called Life; it is only by becoming allies of Nature that we savor the full joy of growing things."

Dr. Thomas William Stevenson in *The Bedford Gardener's Almanac*

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL GARDENING

COLOUR ALL THE YEAR ROUND: A COMPLETE HANDBOOK FOR THE SMALL FLOWER GARDEN. Genders, Roy. 287 pages, illustrated, indexed. St. Martin's Press, New York. 1963. $5.95.

Climatic conditions and methods of plant culture in Great Britain are quite different, for the most part, from those in many sections of the United States. Because of these factors, Mr. Genders' tantalizing suggestions must be followed with caution and discretion by gardeners on this side of the Atlantic.

GARDEN TO ORDER. Kraft, Ken. (Introduction by Pearl S. Buck) 324 pages, illustrated, bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1963. $4.95.

A breezily presented, informative, hybrid-sort of a book—part biographical (The Burpees) and part common sense tips for the amateur gardener. Ken Kraft's lively style of writing is known to readers of *The New Yorker*, *The Saturday Evening Post*, and *Esquire*.

SPECIAL KINDS OF PLANTS

CAMELLIAS. Anderson, E. B. 115 pages, illustrated (part colored), indexed. Charles R. Branford, Newton Centre, Mass. 1963. $2.95.

The author, who is a recipient of a Veitch Memorial Gold Medal, has written this little book to encourage owners of small gardens in Great Britain, who have suitable climate and soil, to grow more and better camellias. In his concluding chapter he writes, "I hope that this book will be of use as a framework upon which someone can build the much needed companion to Harold H. Hume's *Camellias in America*."

THE COMPLETE GUIDE TO BULBS, Synge, Patrick M. 320 pages, illustrated (part colored), bibliography. E. P. Dutton and Co., New York. 1962. $6.95.

This encyclopedic work---one of the outstanding garden books of the year—was written by an eminent British plantsman, who is at present Editor of the *Journal of The Royal Horticultural Society*. Mr. Synge has liberally interpreted the term bulb and has written of not only true bulbous plants but of some other subjects which have corms, tubers, and rhizomes. Beardless irises and dahlias have not been included.

American gardeners must bear in mind that this book originated in Great Britain and that British climatic conditions, pests and diseases, cultural directions, and proprietary preparations differ from those in this country.

357 bulbs are illustrated, of which 330 are in color.

GARDEN PINKS. Genders, Roy. 160 pages, illustrated (part colored), indexed. St. Martin's Press. New York. 1963. $5.95.

Hundreds of varieties and derivatives of *Dianthus plumarius* are described, a high percentage of which are listed in British nurserymen's catalogs—scarcely two dozen are available from American commercial sources. Mr. Genders, writing primarily for the British amateur gardener, has covered his subject well, with chapters on the history, classification, culture, pests and diseases, propagating, exhibiting, and marketing of garden pinks. There are also sections devoted to window boxes, trough gardens, alpine gardens, paving and wall gardens, and the alpine house.

GOURDS, DECORATIVE AND EDIBLE FOR GARDEN, CRAFTWORK AND TABLE. Organ, John. 189 pages, illustrated (colored frontispiece), bibliography, indexed. Charles T. Branford, Newton Centre, Mass. 1963. $7.95.

The history, growing, harvesting, preserving, and the many uses of gourds are well presented by a British gourd enthusiast. In addition to gourds, some other cucurbitaceous members are considered.

THE PEONIES. Wister, John C., ed. 220 pages, illustrated, bibliography, indexed. American Horticultural Society, Washington, D. C. 1962. Paper, $3.50; Cloth, $5.50.

Nine outstanding peony authorities are contributors to the present volume which is divided into two sections: I. The Herbaceous Peonies (published for the first time); II, The Tree Peonies (reprinted from the January, 1955, issue of *The National Horticultural Magazine*). History, classification, descriptions of species and varieties, culture, propagation, hybridizing, pests, bibliography, lists of explorers, collectors, breeders, nurserymen, public and private collections—in short, a complete, up-to-date, authoritative reference work.

SHRUB ROSES OF TODAY. Thomas, Graham S. 240 pages, illustrated (part colored), bibliography, indexed. Phoenix House, London. 1962. $5.95.

The present title is a continuation or supplement of the author's *The Old Shrub Roses* which was first published in 1955 and revised in 1960. Mr. Thomas is the manager of a well-known English nursery and holds the post of official Gardens Adviser to the National Trust. There is a key to the major groups of cultivated roses by Gordon D. Rowley, formerly Keeper, National Rose Species Collection, John Innes Horticultural Institution.

YOU CAN GROW CAMELLIAS. Noble, Mary and Blanche Graham. 257 pages, illustrated (part colored), indexed. Harper and Row, New York. 1962. $7.50.

The successful growing of hardy camellias is no longer reserved for those gardening in southern climes. Here is a most comprehensive, generously illustrated manual on the culture, propagation, and uses of camellias (indoors and outdoors), with considerable space devoted to the new cold-hardy and heat-tolerant hybrids. The fine directory of famous camellia collections both here and abroad is an invaluable aid.

HERBS AND MEDICINAL PLANTS

MY GARDEN GATE IS ON THE LATCH: THE STORY OF MY GARDEN. Farwell, Edith Foster. 77 pages, illustrated. Herb Fun, Lake Forest, Ill. 1962. $4.95.

More delightful "herby" tidbits from the author of *Have Fun with Herbs* (1958), with intriguing chapter headings, such as "A Garden of Physicks," "Bee Stings Cure Arthritis, a Poem," "A Biblical Garden," "Our Williamsburg Garden," "The Salad Garden," and "Herbs for Teas."

MEDICINE AMONG THE AMERICAN INDIANS. Stone, Eric. 139 pages, illustrated, bibliography, indexed. (Clio Medica: a series of primers on the history of medicine, No. 7) Hafner Publishing Co., New York. 1962. Paper, $2.45.

A reprint edition of a little American Indian classic which was first published in 1932. It is stated that the Indians added fifty-nine drugs to our modern pharmacopoeia.

INSECTS AND DISEASES

INSECTS IN RELATION TO PLANT DISEASE. Carter, Walter. 705 pages, illustrated, bibliography, indexed. John Wiley and Sons (Interscience Div.), New York. 1962. $25.00.

A fully documented manual by the Entomologist and Senior Scientist of the Pineapple Research Institute of Hawaii, who is also Professor of Entomology at the University of Hawaii. This book covers the wide field of plant-disease transmission by insects and of present control measures. It is presented under three main headings: Plant Pathogens Transmitted by Insects; The Toxicogenic Insect and Phytotoxemia; and the Plant Viruses.

TREES AND FORESTRY

THE AGELESS RELICS: THE STORY OF SEQUOIA. Taylor, Norman. 115 pages, illustrated (part colored), bibliography, indexed. St. Martin's Press, New York. 1962. $3.95.

Norman Taylor has given a most readable and dramatic account of the California redwoods—the discovery, the naming, and the saving and preserving of these spectacular trees. From old journals, diaries, and newspapers, he has gleaned a thrilling miscellany of historical anecdotes which include such famous personages as P. T. Barnum, Horace Greeley, James Gordon Bennett, Prince Albert, Queen Victoria, Sir Joseph Paxton, and the Duke of Wellington.

There is an excellent directory of the outstanding and important trees and groves.

FOREST ECOLOGY; THE FOREST ENVIRONMENT, THE FOREST COMMUNITY AND THE FOREST ITSELF. Spurr, Stephen H. 290 pages, bibliography. Ann Arbor Publishers, Ann Arbor, Mich. 1962. Paper, $4.00.

Dr. Spurr, who is Dean and Professor of Natural Resources, School of Natural Resources, at Ann Arbor, states in his preface: "*Forest Ecology* is a preliminary and incomplete version of a projected book on the ecological foundations of silviculture." The section devoted to phytogeography contains chapter headings: "Historical Development of the Forest," "The American Forest since 1600," "Forests of the World,"

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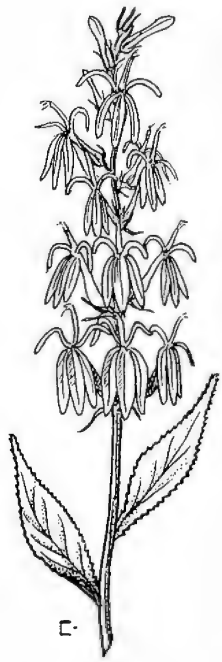

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**All fees are contributed to the Native Plant Garden of The New York Botanical Garden.*

and "Forest Regions of the Western United States and Canada."

PRODUCING, HARVESTING, AND MARKETING HIGH QUALITY SOUTHERN TIMBER. Hopkins, William C., ed. 107 pages, bibliographies. Louisiana State University Press, Baton Rouge, La. 1962. $4.00.

Papers given at the eleventh annual forestry symposium, 1962, with recorded minutes of "question and answer" periods.

THE WORLD IS MY WOODLOT. Kernan, Henry S. 210 pages, Pageant Press, New York. 1962. $3.00.

A professional forester writes of the rewards and satisfactions he has known in his life-long career in the forest service. He offers a collection of vivid essays in which are recorded some of his observations of the forest lands not only of North America but of Europe, Asia, and South America.

REGIONAL BOOKS

COMMON EDIBLE AND USEFUL PLANTS OF THE WEST. Sweet, Muriel. 66 pages, illustrated, bibliography, indexed. Naturegraph Company, Healdsburg, Cal. 1962. Paper, $1.00.

Another fine Naturegraph publication under the editorship of Vinson Brown; with botanically accurate, detailed line-drawings of over one hundred familiar western plants which were once used by the native Indians and early pioneers. An invaluable booklet for plant identification with an excellent background of plant history and lore.

DESCANSO GARDENS; ITS HISTORY AND CAMELLIAS. Thompson, Douglas G. 64 pages, illustrated (part colored). Borden Publishing Co., Los Angeles, Cal. 1962. Paper, $1.00.

At Descanso Gardens, in southern California, one hundred thousand specimens of more than six hundred varieties of camellias are on public display. The County of Los Angeles operates these gardens as a public trust under the direction of the Department of Arboreta and Botanic Gardens. This attractive and informative booklet offers interesting facts on the history of this vast collection and also contains brief cultural and historical notes on the camellia.

THE DESERT WORLD. Pond, Alonzo W. 342 pages, illustrated, indexed. Thomas Nelson and Sons, New York. 1962. $6.50.

An enlightening and entertaining account of the many aspects of desert life "from the little 500-acre Desert of Maine to the 3,000,000 square miles of the Sahara" by a man who has led numerous expeditions to arid regions. One chapter is devoted to desert plants and their curious ways of survival.

EARLY NEW ENGLAND GARDENS: 1620-1840. Favretti, Rudy J. 20 pages, illustrated, (Old Sturbridge Village Booklet Series) Old Sturbridge Village, Sturbridge, Mass., 1962. Paper, $1.00.

From a careful scanning of diaries, journals, and travelers' accounts, Mr. Favretti has pieced together a fascinating collection of notes and plans of the austere and utilitarian gardens of colonial New England. Included are tabulations of flowers, shrubs, herbs, vegetables, and fruits which were recorded "before 1700," "1700-1750," and "1750-1800."

EARLY USES OF CALIFORNIA PLANTS. Balls, Edward K. 103 pages, illustrated (part colored), bibliography, indexed. (California Natural History Guides, No. 10) University of California Press, Berkeley, 1962. Paper, $1.75.

A fascinating little guide, with good illustrations, to the food, drink, masticatorial, fumitorial, fiber, basketry, medicinal, dye and gum plants which were used by the Indians and early white settlers of California, with a chapter on the present uses of some California plants.

THE FLOWER WORLD OF WILLIAMSBURG. Dutton, Joan P. 148 pages, illustrated (part colored), bibliography, indexed. Holt, Rinehart and Winston, New York. 1962. $4.95.

A British gardener by birth but an ardent American plantswoman by adoption, Mrs. Dutton writes eloquently of Williamsburg, the Royal Colony, and of restored Colonial Williamsburg, as it is today. She is adept in her portrayal of the flowers and their arrangements, and the gardens and their designs—rich with tradition and history. The book is well illustrated.

THE GARDEN IN THE PLAINS, 4th ed. Harler, Agnes W. 480 pages, illustrated, indexed. Oxford University Press, New York. 1962. $6.00.

The plains of India afford an environment conducive to the growing of a wide variety of plants, according to Agnes W. Harler whose practical gardening manual has now appeared in a fourth revised edition. From it we learn that one of the great advantages of gardening in India is to be found in the rapidity with which most trees grow—a sapling may become a considerable tree in six or seven years. In districts where there is a marked cool season, one can have great masses of annuals in contrast to flaming tropical flowers of the hot months. A well-written, comprehensive, non-technical guide, written for the garden amateur living in India.

THE GREAT CALIFORNIA DESERTS. Lee, W. Storrs. 306 pages, illustrated, indexed. G. P. Putnam's Sons, New York. 1963. $5.95.

The Mojave, the Colorado Desert, and Death Valley—these are the deserts whose history, geography, geology, folklore, fauna, and flora the author of *Green Mountains* and *The Sierra* has chosen this time to chronicle. Not only does Mr. Lee dig deeply into the past but in one chapter, facetiously entitled "Goodness Gracious, All That Scenery for Cinema," he narrates the advent of the motion picture titans.

GUIDE TO SOUTHERN TREES, 2nd ed. Harrar, Ellwood S. and J. George Harrar. 709 pages, illustrated, bibliography. Dover Publications, New York. 1962. Paper, $2.25.

An unabridged republication of the 1946 edition with the nomenclature revised to conform to current practice. A handy pocket-size manual with excellent detailed line-drawings.

A HANDBOOK TO PLANTS IN VICTORIA. Willis, James H. Vol. 1: Ferns, Conifers and Monocotyledons. 448 pages, indexed. Cambridge University Press, New York. 1962. $8.50.

(Continued on page 118)

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. Dr. William S. Steere, Director, was one of the speakers at Members' Evening on April 4, 1963, —his topic: "Greenland Visited." During the past several months he attended the annual meeting of the Board of Trustees of *Biological Abstracts* in Philadelphia, meetings of the Executive Committee and of the Governing Board of the American Institute of Biological Sciences in Washington, D. C., a meeting of the Council of the New York State Association of Museums in Albany, a meeting of the Seventh Conference of Directors of Systematic Collections in Pittsburgh, a meeting of the Governing Board and a meeting of the Board of Trustees of the Morris Arboretum in Philadelphia.

Dr. Steere delivered his annual report at the annual meeting of The New York Botanical Garden on May 6, 1963, and will participate in the Spring Garden Tour on May 16, 1963.

Dr. H. W. Rickett enjoyed a brief vacation in Arizona March 1-10, 1963. On April 1, 1963, Dr. Rickett terminated his duties as Bibliographer, Senior Curator of the Library, and Deputy Assistant Director (Botany) to become Senior Curator of Botany, devoting his time to the preparation of a definitive series of five volumes on the wild flowers of the United States. The first volume will be concerned with the northeastern United States, south to approximately the Mason-Dixon Line and west to the limit of forest, somewhat west of the Mississippi River. Subsequent volumes will deal with the southeastern United States westward through the wet forests of easternmost Texas; the southwestern states, including most of Texas and intervening states westward through most of California; the Pacific Northwest, including the region of northern California, Oregon, Washington, with very high rainfall; and the Rocky Mountains, the Great Plains, and the intermountain region. Mrs. David Rockefeller, a member of the Board of Managers of The New York Botanical Garden, heads the National Committee for the Wild Flowers of the United States. The primary purpose of the Committee has been fund raising and in arousing interest in the program of wild flower publication.

Dr. P. P. Pirone, Plant Pathologist, discussed the pro's and con's of chemical sprays at a meeting of the Mamaroneck Garden Club and dormant spraying with Ruth Alampi on her "Home and Garden" radio program over NBC. He was interviewed by Ed Joyce on "What is going on at The New York Botanical Garden," and about spring chores in the home garden, on his CBS radio program.

Dr. Arthur Cronquist, Curator, started westward the end of April. He will be engaged in field work in Utah and Nevada and other western areas during the summer months.

Dr. Howard Irwin, Associate Curator, in his talk before the Torrey Botanical Club on "Botanizing in the Guiana Lowlands," emphasized the conduct of expeditions in this difficult area, dwelling upon the mechanics of the movement of men and materials rather than on the plants themselves.

Dr. Edmund H. Fulling participated in the thirteenth Spring Wild Flower Pilgrimage at Gatlinburg, Tennessee, April 25-27, 1963. This is sponsored annually by the Botanical Department of the University of Tennessee, the Great Smoky Mountains and Gatlinburg Garden Club, and the Gatlinburg Chamber of Commerce, and attracts a large number of participants, as many as six hundred. It would take at least four pilgrimages to accomplish all the scheduled field trips, taking in two on any one pilgrimage.

Dr. Herman F. Becker, Research Associate, is mentioned in the article "Two Fossil Floras of the Negev Desert," by Dr. Jacob Lorch in *Natural History*, March, 1963. Dr. Becker assisted Dr. Lorch when he began excavations in Makhtesh Ramon, which site in Israel yielded fossils of Jurassic plants.

Miss Elizabeth H. Hall, Sarah Gildersleeve Fife Research Librarian, gave an illustrated talk on "Scents—and Scents" before the annual meeting of the Federated Garden Clubs of New York State Inc., in New York City, held during the week of the International Flower Show. Miss Hall has also been busy lecturing before different garden clubs the past several months. She returned on May 6, 1963, from a round-the-world garden tour, arranged by Lindblad Inc., and conducted by T. H. Everett, Assistant Director (Horticulture).

Robert Jones, Administrative Librarian, attended the annual meeting of the Bibliographical Society of America, held at the Morgan Library, in January, 1963.

Mrs. Trevor McMorris, Assistant Librarian, returned the middle of March from a five-week visit to Jamaica with her husband, Dr. McMorris, Research Associate. While there she visited several libraries and botanical gardens.

Dorothy Ebel Hansell, Editor of *The Garden Journal*, lectured before the Old Guard of Summit, New Jersey, and adjacent area on "The Four Seasons at The New York Botanical Garden." Mrs. Hansell also gave this talk, which is illustrated by beautiful kodachromes taken by Walter Singer, the Garden's staff photographer, before several garden clubs. She attended an Azalea and Rhododendron Workshop and a regional meeting of the Garden Writers' Association of America at Callaway Gardens, Pine Mountain, Georgia. En route she called upon several authors in North Carolina and South Carolina and visited notable gardens in these states.

Native plants from the northeastern United States were featured in the exhibit of The New York Botanical Garden at the International Flower Show. It was an appealing spring scene with white paper-bark birch, dogwood, and azaleas setting a background for the ferns and trilliums, blood-root, hepaticas, birdsfoot violets, lady-slippers, trailing-arbutus, and

Right. The native plant garden, exhibited by The New York Botanical Garden at the International Flower Show, is being constructed. Richard Livellara covers some of the rocks with sheet moss.

Below. Thomas Blaney, Head Gardener at the U. N., annually assists the Gardening Department in erecting the Garden's exhibit at the International Flower Show, tangible evidence of his continued interest in The New York Botanical Garden where he was a foreman for a number of years.

William H. Schleisner.

Right. Samuel H. Gottscho is hanging photographs for the William H. Schleisner Memorial Exhibit at The New York Botanical Garden.

other small natives planted on mossy-green stream banks.

This was not an easily erected exhibit—wild plants are not as readily "managed" as are the showy tulips, hyacinths, and lilies. Work on this native plant garden began more than a year ago, with the selection of material. Then last fall whole sections of earth and living plants had to be dug up, then brought into warm greenhouses later on for forcing so they would burst into flower at the right time for the opening of the show. Putting plants, particularly native, on so rigorous a time schedule, demands horticultural "know-how."

Another task is moving earth and rocks and plants from the Botanical Garden in Bronx Park downtown to the Coliseum in mid-Manhattan. This requires specially heated trucks, thorough covering of the plants, and careful handling at every stage.

Native plants were an appropriate exhibit subject, for The New York Botanical Garden is developing a Native Plant Garden, which will eventually be one of the best collections of native plants of northeastern United States in the country.

The exhibit at the International Flower Show received the silver medal of the Show and the special bronze medal of the Federated Garden Clubs of New York State, Inc., for the finest educational exhibit in the show.

An exhibition of the botanical work of Mary Gibson Henry will be held in the Museum and Administration Building, opening June 1 and continuing until the middle of November. It will consist of photographs and equipment from her many far-flung expeditions devoted to the discovery and preservation of rare native plants, together with material describing her propagating and hybridizing methods and photographs of the collections in her garden at Gladwyne, Pennsylvania. Mrs. Henry is President of the Philadelphia Botanical Club, Research Associate of the Academy of Natural Sciences, honorary member of the Botanical Society of Edinburgh, and a former director of the American Horticultural Society. Her awards include the Schaffer Gold Medal of the Pennsylvania Horticultural Society, the Herbert Medal of the American Plant Society, the Florens DeBevoise Medal of the Garden Club of America, and honorary degree Master of Science from the University of Pennsylvania.

The exhibition will cover a wide range of field work, conservation, and the propagation of hitherto unknown plants.

Memorial Exhibition. From February 7 until April 1, a memorial exhibition of the photographs of William H. Schleisner was held in the Museum and Administration Building of The New York Botanical Garden. The following "In Memoriam" was written by Samuel H. Gottscho and was a part of the photographic exhibit very beautifully arranged by Mrs. Charles H. Burlingham, Chairman of the Display Committee, and Mr. Gottscho.

In Memoriam

For twenty-seven years Bill Schleisner worked at my side. At first an observer and then apt pupil, he readily absorbed my answers to his many questions into a great fund of knowledge about techniques in architectural photography. Experience matured his considerable talents. Before long he had become a skilled photographer, and, with his engaging personality and smile, an invaluable associate who was to create many assignments and make many friends over the years. From 1940 he shared my growing interest in the photography of gardens and horticulture, both of which are the complements of architecture.

At first my pupil, he later became my master, for I learned much from him. He was devoted to his work and had a deep regard for perfection in technique and attention to detail. Whether photographing a garden or the grand ballroom of a great hotel, he was ever watchful for the minor faults which could mar an otherwise perfect picture.

He had no photographic ego, but rather a sense of grave responsibility to best interpret the work of his client. And this he did with artistry and judgment, adapting his photography to the changing demands of each assignment and the needs of the client.

In 1939 he became my son-in-law. But I always considered him the son I never had, for no son could have been more devoted to a father.

Visitors to the Garden.

Dr. Charles D. Richards, University of Maine, Orono, Me.

Mrs. Endre Brunner, La Paz, Bolivia.

Dr. Marlin A. Espenshade, Wyeth Laboratories, Inc., West Chester, Pa.

Dr. R. A. Ludwig, Plant Research Institute, Ottawa, Ont., Canada.

Dr. L. E. Jackson, and Prof. Robert K. and

Florence M. Zuck, Drew University, Madison, N. J.

Dr. William Bridge Cooke, R. A. Taft Sanitary Engineering Center, Cincinnati, Ohio.

Dr. Francis Drouet and Dr. A. E. Schuyler, Academy of National Sciences, Philadelphia.

Dr. Richard Browne, Jr., Department of Botany, University of Kentucky, Lexington.

Dr. George S. Bunting, Bailey Hortorium, Cornell University, Ithaca, N. Y.

Dr. W. Meijer, Forestry Department, North Borneo.

Dr. N. P. Kifferer, C.S.I.R.O., Canberra, Australia.

Harry Smith and H. R. Chen, Biology Department, Yale University, New Haven, Conn.

Dr. S. Gross, Boyce Thompson Institute, Yonkers, N. Y.

Dr. James E. Gunckel, Gary Larson, and R. P. Singh, Botany Department, Rutgers University, New Brunswick, N. J.

Dr. George W. Woodwell, S. Smith, K. J. Scott, G. A. M. Brown, Ralph Becker, and J. K. Oacting, Brookhaven Laboratory, Upton, N. Y.

Dr. Hubert J. Dyer, Brown University, Providence, R. I.

Dr. William C. Denison, Swarthmore College, Swarthmore, Pa.

Dr. Alexander H. Smith, University of Michigan, Ann Arbor, Mich.

Dr. Margaret Fulford. University of Cincinnati, Cincinnati, O.

The Snuff Mill Restaurant at The New York Botanical Garden opened on April 6, 1963, under new management. It will be operated as a snack bar, later as a restaurant.

Bonsai Society. Plans for a national and eventually an international organization of bonsai enthusiasts are being framed by the newly organized Bonsai Society of Greater New York, which meets at The New York Botanical Garden.

The popularity of the art of bonsai, which originated in Japan, has been increasing in the United States for the past decade. In recent years classes on the subject have been given at The New York Botanical Garden and also at the Brooklyn Botanic Garden.

Officers of the Bonsai Society of Greater New York are: Jerald Stowell, Armonk, N. Y., President; Walter Hahn, Pleasantville, Vice President; Raymond Porter, New York City, Corresponding Secretary; Mrs. C. V. Smith, Larchmont, Recording Secretary; and Mrs. George Case, Bedford, Treasurer. Membership is open to residents of the entire metropolitan zone in New York, New Jersey, and Connecticut. Information may be obtained by writing The New York Botanical Garden, Bronx 58, N. Y.

The Massachusetts Horticultural Society appointed Carlton B. Lees to succeed Arno H. Nehrling as Executive Secretary and Director of Publications. Mr. Nehrling, who has been with the Society for thirty years, asked to be relieved of these duties but will continue as Director of Exhibitions.

Mr. Lees has been Director of the Pennsylvania Horticultural Society since August, 1959, and for the previous five and a half years was Horticulturist at Kingwood Center, Mansfield, Ohio. He was Assistant Horticulturist at the Brooklyn Botanic Garden, where he did editorial work for *Plants and Gardens*. As a member of the faculty of West Virginia University, Mr. Lees taught landscape design. He is author of *Budget Landscaping*.

The Pennsylvania State University offers a correspondence course in "Perennials and Biennials for Your Flower Garden," in which almost one hundred kinds are presented, their selection for special situations and their culture being covered. The course is obtainable for $2.50 from Box 5000, University Park, Pennsylvania—check should be made payable to The Pennsylvania State University.

The seventy-fifth anniversary of research on plant diseases was observed at the Connecticut Agricultural Experiment Station on May 7 and 8, 1963. The program will cover several areas—natural biochemical resistance to diseases in plants, plant chemotherapy, fungicidal action, and plant pathology, with pertinent papers presented by American, Canadian, and foreign plant scientists.

At the evening meeting on May 7, on the history of plant pathology, the speakers were G. L. McNew, Director of the Boyce Thompson Institute for Plant Research at Yonkers, New York, and James G. Horsfall, Director of the Connecticut Station and formerly head of the Department of Plant Pathology and Botany.

The scientific study of plant diseases began at this Station in July, 1888, with the appointment of Dr. Roland Thaxter. In 1891 he returned to Harvard, from which he had been graduated magna cum laude. His monographs and drawings remain valuable contributions.

Organizational changes at Longwood Gardens. Dr. Russell J. Seibert, Director, has announced these organizational changes in the administration of Longwood Gardens, Kennett Square, Pennsylvania. The supervisory departments are Horticulture, Administration (formerly the Business Office), and Maintenance. Heading up these departments are Everitt L. Miller, Assistant Director (in charge of horticulture), George E. Thompson, Sr., Business Administrator, and K. R. Bowen, Superintendent, Maintenance Department.

Other changes include transfer of the Horticultural Information Service to the Short Course Office under the direction of Mrs. J. Folsom Paul, Education Supervisor, and assignment of Publicity Coordination to Mrs. Violet K. Thomas, Tour Coordinator.

The Garden State Iris Society, Region 19 of the American Iris Society, is holding its annual show, "Iris Gems," on May 26, 1963, at Fairleigh Dickinson University, in the Madison Campus gymnasium, once the "playhouse" of the beautiful Twombly Estate. The show will be open free to the public from 2-5 p.m.

Horticultural and arrangement entries are welcome from all gardeners. Closing date for arrangement entries is May 17. Iris must predominate in arrangements displayed in niches 32 x 28 x 14, light green in color. Apply to Entries Chairmen: Mrs. James Henderson of the Garden Department of the Woman's Club of Chatham, 265 Fairmount Ave., Chatham, New Jersey, or Mrs. Joseph Harter, Jr., Town and Country Garden Club of Chatham, 8 Plymouth Rd., Chatham, Junior Entries Chairman is Mrs. Bruce Abrams, Garden Department of the Woman's Club of Chatham, 86 North Hillside Ave., Chatham.

General Show Chairman Mrs. Zeh Dennis, of Chatham, reports that iris specimens will be displayed in color classes and must be brought before 11:00 a.m. the day of the show for display and judging.

American Daffodil Society members enjoyed a distinctive setting—the Stratford, Connecticut, Motor Inn and its attractive Guildhall—for its annual meeting April 25-28, 1963. The committee in charge of arrangements headed by Mrs. John D. Nelson, Jr., as chairman and George S. Lee, Jr., as treasurer, planned a stimulating program.

Dr. William L. Brown, of Johnston, Iowa, who has grown daffodils for twenty years and has a special interest in polyploidy, discussed "The Possibilities Offered the Daffodil by Current Plant Genetics"; Dr. Frances de Vos, Assistant Director of the U.S. National Arboretum talked about "Daffodils in the National Arboretum"; and Elizabeth Lawrence of Charlotte, N. C., enthusiastic gardener and delightful author, was the speaker at the annual banquet—her topic "Small Talk about Daffodils."

Tours to gardens widely known for their plantings of daffodils, the eighth annual Connecticut Daffodil Show in Old Greenwich, and a daffodil study and show school Course II provided a well-rounded program.

Mexico-Guatemala Garden and Wild Flower Tour will be conducted by Phil Clark, for ten years the garden editor of *The News* in Mexico City, former editor of *Horticulture* magazine, Boston, and presently Assistant to the Director (Public Relations) of The New York Botanical Garden. The tour leaves on October 4, 1963, by air from New York with luxury bus travel for ground segments of the trip, beginning from Mexico City. Ruins of Toltec, Zapotec, Olmec, and Mayan civilizations will be co-featured with contemporary and Spanish-colonial private gardens and stops in important temperate and tropical wild flower zones. Mr. Clark, who has conducted numerous Mexico-Guatemala garden and wild flower tours, will be assisted by Mexican and Guatemalan guides with special archeological and historical background.

Information on this twenty-four day Mexican trip may be obtained by writing Jean Berke Travel Service, Inc., 518 Fifth Ave., New York 36, N. Y.

BOOK REVIEWS (Continued from page 115)

The first part of a two-volume key to the flora of the State of Victoria in Australia. Full and useful data is recorded with each species as to references to illustrations, vernacular names, and diagnosis.

HOMES AND GARDENS IN OLD VIRGINIA. Christian, Frances A. and Susanne W. Massie., eds. Revised for The Garden Club of Virginia by Ella W. Smith, Caroline P. Strudwick and Frances C. Guy. 544 pages, illustrated, (colored frontispiece), indexed. Garrett and Massie, Richmond, Va., 1962. $7.50.

In 1930, the first edition of this title appeared in the form of a guide book which was written

primarily to assist tourists coming to Virginia during Garden Week. In 1950, the editors departed from the original small format and produced a magnificently illustrated reference work to the outstanding houses and gardens throughout the whole state. The present 1962 edition has been thoroughly revised, with new illustrations and additional places included, to make a total of almost two hundred of the Old Dominion's historic homes and gardens.

LAND ALIVE; THE WORLD OF NATURE AT ONE FAMILY'S DOOR. Rood, Ronald N. 144 pages, illustrated, indexed. Stephen Greene Press, Brattleboro, Vt. 1962. $4.50.

Land Alive is a fitting title for this collection of entertainingly and authoritatively written nature narrations by a high school biology teacher, who lives with his wife and four children on a hundred-acre section of farmland in Vermont.

A NATURALIST IN ALASKA. Murie, Adolph. 302 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1963. Paper, $1.45.

"Adolph Murie is a most discerning field naturalist, with keen vision, infinite patience . . . and the honesty to report things as he sees them. He is a staunch advocate of conservation." These words are taken from the foreward of this paperback edition written by Dr. Harold E. Anthony of The American Museum of Natural History. The original edition appeared in 1961.

PICTORIAL PLANT GUIDE FOR MILD REGION LANDSCAPING. Peart, Paul. J. 200 pages, illustrated. Montvalla Publishing Co., Monterey Park, Cal. 1962. $19.75.

Something new in a landscaping book—a subtropical plant directory with over three hundred and seventy-five diagrams illustrating the use of these plants in mild region landscaping. Brief descriptive and cultural notes accompany each picture.

TREES OF NORTHERN FLORIDA. Kurz, Herman and Robert K. Godfrey. 311 pages, illustrated, bibliography, indexed. University of Florida Press, Gainesville, Fla. 1962. $8.50.

A carefully illustrated, simply written manual for the layman. Technical descriptive terms used in the keys and descriptions are clearly defined in the glossary. The southern boundary of this book's range is fixed by a line extending from the Atlantic Coast through Ocala Forest, Marion County, thence across and through the Gulf Hammock, Levy County, to the Gulf Coast. With few exceptions the trees that are here described will include those in the southern parts of Georgia, Alabama, and Mississippi.

ECONOMIC PLANTS

THE TECHNOLOGICAL VALUE OF THE SUGAR BEET. Henry, J., ed. (Proceedings of the Eleventh Session of the Commission Internationale de Sucrerie, Frankford, 1960) 320 pages, illustrated, indexed. American Elsevier Publishing Co., New York. 1962. $12.50.

Complete texts of fifteen papers (English, French, and German) presented by leading authorities and the minutes of the ensuing discussions. Offers a broad survey of recent sugar beet investigations in European research centers and includes culture, extraction, and refining.

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THE GREAT OUT-OF-DOORS

FACE OF NORTH AMERICA: THE NATURAL HISTORY OF A CONTINENT. Farb, Peter. 316 pages, illustrated, bibliography, indexed. Harper and Row, New York. 1963. $6.50.

The North American traveler who wishes to learn about the noteworthy natural features of the sections of the country through which he is journeying will find this volume an invaluable reference directory. Marston Bates, who wrote an enthusiastic introduction, states: "There should be a copy carried in every car." The main body of the book is devoted to easily readable descriptions of physiographical and ecological phenomena—the mountains, forests, drylands, inland water, and sea coasts. In the appendix are to be found the locations and brief critical comments of the important natural areas, which are listed under state and province.

LAND, PEOPLE AND HISTORY. Helfman, Elizabeth S. 271 pages, illustrated, bibliography, indexed. David McKay Co., New York. 1962. $4.95.

"The time has come when people who do not care about the land must not be allowed to ruin it for the people who will have to make their living from it in the future"—thus writes Mrs. Helfman in her informative account of man's use and misuse of the soil from the earliest times up to the present day, and of such ardent conservationists as Louis Bromfield, Edward Faulkner, and Sir Albert Howard.

THIS IS MY LAND. Caidin, Martin and James Yarnell. 198 pages, Random House, New York. 1962. $14.95.

It took fifty-eight days and fifty-five thousand miles of flying to produce this magnificent album of over two hundred and fifty superb aerial views of our country. Martin Caidin wrote the brief captions and diary notes. James Yarnell caught the breath-taking photographs which range from the depths of Death Valley to the towering Rockies.

LETTERS TO THE EDITOR

Rupert C. Barneby received the following letter from Hortense Spoehr (Mrs. Horace P.) Miller of Larchmont, New York, after the publication of his article on "Type Hunting in Europe" in *The Garden Journal*, November-December, 1962. Mrs. Miller's letter appears here with her permission:

"Type Hunting in Europe" was not only very interesting in general, but of an electrifying fascination for me on the last page, in which you mention A. B. Lambert and his herbarium.

Recently I have been doing some historical and biographical work on Lambert and have come on any number of mysteries in connection with his herbarium. Your taxonomical approach to several of the same puzzles has been most valuable for me . . Apparently, Lambert willed his herbarium to the British Museum under certain conditions, but the Museum rejected the conditions, and the herbarium was put up for auction. (So far I have been unable to find out what the conditions were, or why the Museum rejected them.) Kew apparently owns a copy of the auction catalog, but I did not have the time to examine it when at the Kew Library, and so I do not know whether it is even a priced copy, much less that rarest of finds,

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one marked with the buyers' names.

The priced copy of the auction catalog of Lambert's library, which is in the New York Public Library, also contains a tangential mystery; a manuscript listed at the end is crossed out in a firm, official way and no price given. The title is Ruiz and Pavón's original mss. In Spanish, "filling a mahogany box 20 inches by 15." (Unfortunately, when I went back to check the reference for completeness, the library reported that the volume was "temporarily misplaced.") But I would guess that this manuscript was deemed a proper part of the Ruiz and Pavón collection and hence went to the buyer of the latter. What with the infinite, international tangle of Ruiz and Pavón bibliographical matters, I have not yet ascertained exactly what the British Museum now owns.

Your statement that the Pallas collection is now in the British Museum seems to me a great clue. For in David Don's list of the contents of the Lambert herbarium, #23 is as follows: "The very extensive herbarium of the celebrated Professor Pallas, collected in the various provinces of the Russian empire, which was purchased at Petersburg during the tyrannical reign of Paul I by Mr. Cripps, companion of the late Dr. Clarke, and by him resold to Mr. Lambert."

In other words, if one part of Lambert's herbarium is now in the British Museum, perhaps others are as well. Britten and Boulger state that it is in part in the British Museum, and was partly bought by Delessert and Lasegue. But I have found no corroboration of this statement, nor of that in the *Dictionary of National Biography* that Ruiz and Pavón's Chilean and Peruvian specimens in Lambert's herbarium were purchased for the British Museum.

As for the Sessé and Mociño specimens, they do seem to have formed a part of the Ruiz and Pavón collection, for David Don says of the latter, #43: "The Mexican collection appears to me, from the many specimens from California, Unalaska, etc., to have formed a part of the herbarium of Mociño and Sessé, who were many years engaged, at the expense of the Spanish government, in investigating the vegetable productions of the Vice-Royalty of New Spain . . ."

In this same #43, Don substantiates the notion that Lambert's Ruiz and Pavón collection was added to over a number of years from the time of the first published note of the collection (1821), when he says: "A considerable addition to the Mexican portion of the herbarium has been received since Mr. Lambert's notice of this collection has been published." He lists "*Astragalus* 24" and "*Dalea* 46." He also says ". . . in most instances, several duplicates of each species."

Now, since it seems apparent that the Sessé and Mociño specimens were incorporated in the Ruiz and Pavón collection, could it be that when the British Museum received the latter (assuming it did), it gave some of the duplicates to Oxford?

Since my earlier communication, I discovered that the British Museum is supposed to have a copy of the sale catalog of Lambert's herbarium, marked with the buyers' names. I have written for a microfilm, and if it has some interesting new facts, I shall take the liberty of sending them on to you. No doubt it is most unlikely that the Sessé-Mociño specimens would have been sorted out from the rest of the Ruiz and Pavón herbarium, but apparently George Don did considerable work on it after the time his brother David had written his account of the whole Lambert herbarium. Also, a contemporary, (very general) account of the sale says that the Ruiz and Pavón herbarium was "divided into three distinct sets."

This same account also states, "It is to be deplored that the late posessor's intention, as specified in his will, respecting this vast assemblage of botanical objects, could not be complied with; namely that it should, free of cost, be added to the National Herbarium at the British Museum." So it appears that some other condition than a monetary one was involved; and in hopes of finding out what the stumbling block was, I have written to Somerset House for a copy of Lambert's will.

MEMBERSHIP

We were delighted to welcome the following new members between February 1, 1963, and March 31, 1963.

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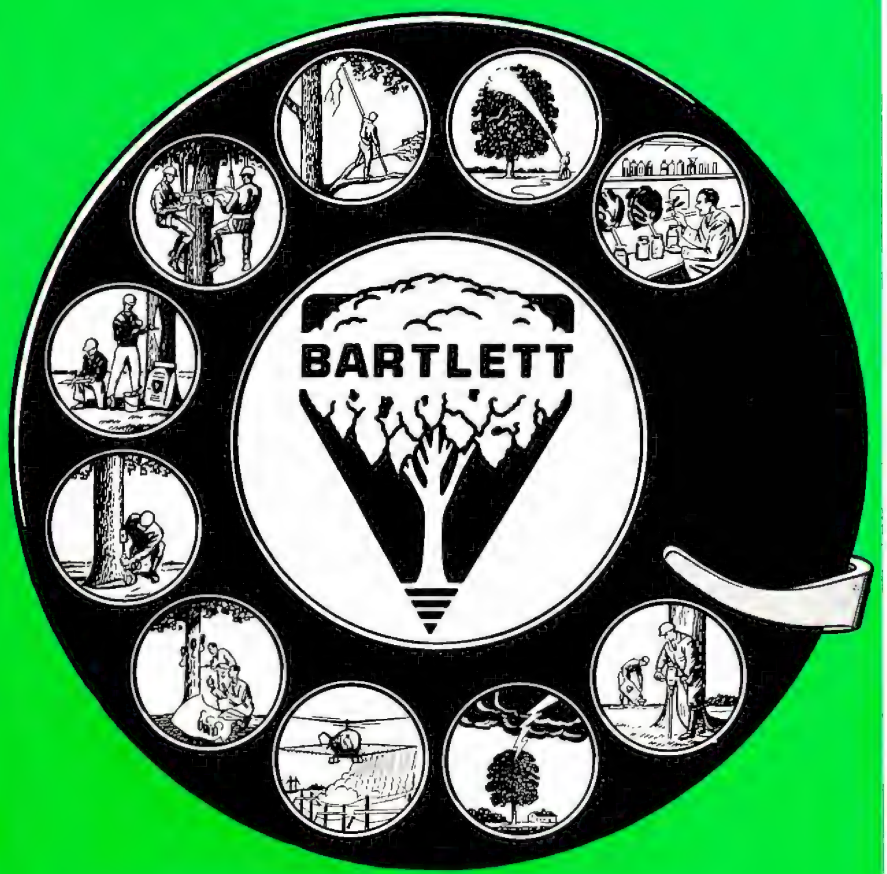

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Vol. 13, No. 4 July-August, 1963

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THE GARDEN JOURNAL

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CALENDAR

August 27 - 31, 1963. Meetings of American Institute of Biological Sciences, University of Massachusetts, Amherst.

October 1, 1963. Annual Theatre Benefit sponsored by the Volunteer Associates, The New York Botanical Garden: preview of "Here's Love" at the Schubert Theatre.

October 5-12, 1963. Fourth World Orchid Conference, Singapore, sponsored by Royal Horticultural Society, American Orchid Society Inc., and Malayan Orchid Society.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

October 12, 13, 1963. Annual Meeting of American Association of Botanic Gardens and Arboretums, St. Louis, Mo.

November 7, 8, 1963. Fall meeting of Holly Society of America at Callaway Gardens, Pine Mountain, Ga.

November 9, 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

December 12, 1963. Holiday House Tour, sponsored by the Volunteer Associates, The New York Botanical Garden.

January 9, 16, 23, and 30, 1964. Lecture Series sponsored by Volunteer Associates, The New York Botanical Garden, in the French Institute Building, 22 East 60th St., New York.

April 22 - 24, 1964. Garden Forum at the Henry Ford Museum, Greenfield Village, Dearborn, Mich.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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Front cover illustration—the Herb Garden of The New York Botanical Garden, photographed by Walter Singer; contents page, water-lilies in the courtyard pool of The New York Botanical Garden, Walter Singer; pp. 122-125, Merry Gardens, Camden, Me.; p. 127, Cornelius Ackerson; pp. 128-129, Inter-State Nurseries, Hamburg, Ia.; pp. 131-133, Phil Clark; pp. 135-137, Theodor Philipp Haas; pp. 139, 147, 149, 153-156, 157, 158, Walter Singer, p. 145, J. K. Coggin, N. C. State College, Raleigh.

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FUCHSIAS IN NEW ENGLAND

By MARY ELLEN ROSS

Mrs. Ross, who has a B. S. degree from Rhode Island University where she majored in horticulture, comes from a family keenly interested in plants. She and her husband, C. Ervin Ross, are the proprietors of Merry Gardens in Camden, Maine, which is internationally known for its collections of begonias, pelargoniums, and other plants.

FOUR BOXES IN WINDOWS with a northeastern exposure, on a dark wall facing the entrance of our driveway, were a problem. Nothing grew well in them. For several years we tried tuberous begonias, then ivy geraniums; one year we included a few fuchsias with the tuberous begonias. Surprisingly the fuchsias made the best showing in this particular problem spot, so the following years we planted the boxes entirely with fuchsias. We used all kinds and colors and mixed the trailers with the uprights. They toppled over each other and actually covered the wall with their showy blooms. Now we hang fuchsias between the boxes and from the eaves so that the whole wall space around the windows is a mass of intriguing flowers.

Fuchsias have always fascinated me, but my interest reached its peak on a visit to the West Coast in the summer of 1959. My collection at that time contained about twenty-five varieties—I thought quite well of it. But I had not realized that fuchsia growing was a full-time occupation for many plantsmen from California to Oregon and Washington. An array of pastel colors showered from the roofs of giant lath- or slat-houses, a sight rivaling anything afforded by hanging tuberous begonias. The floor of the lath houses was also aglow with upright fuchsias.

After taking copious notes on varieties and studying conditions in which fuchsias grow so luxuriantly in the West, I concluded that our Maine climate offered somewhat similar conditions and with proper treatment I, too, could grow fuchsias luxuriantly. Our summers are cool and moist, similar to the Oregon-Washington climate. True, there is a shorter growing season, and this necessitates a greenhouse to get plants started early. But with clean, healthy plants, proper feeding and watering, I was convinced I could have a grand midsummer display of fuchsias.

Because of our success on the northeast wall and our determination to grow fuchsias as well as they are grown in the West, we built a plastic-shell house, high enough to hang fuchsias from the sash-bars and ridge. Such a house becomes very hot and humid in warm weather, so at six-foot intervals on the side walls, which are six feet high, we left six-foot open spaces. (These spaces can be closed with six-foot coldframe sashes in the fall when weather turns cooler.) Not only are the fuchsias spectacular hanging from the top, but intermingled with them and adding to the display is an assortment of other summer-flowering plants, such as browallia, firecracker vine, geraniums, begonias, and foliage plants. However, the fuchsias are the main attraction and contribute the most to the show.

We quickly learned that fuchsias hanging from the roof of a plastic house consume a lot of water, needing it once a day, usually twice on a sunny day. They seem to thrive on water, not only around their roots, but on their foliage, but they must not be "soggy wet." We also learned that weekly spraying with an insecticide-fungicide was imperative to keep the plants clean and healthy.. During their active growing season, they also need fertilizer every two weeks; any well-balanced fertilizer will do. Growing good fuchsias is not difficult, but they do require constant care.

By midsummer picking up dead blooms becomes more time-consuming than any other chore, but this is just part of the job of growing fuchsias as fuchsias should be grown. When visitors come to Merry Gardens, as they do by the hundreds, we know by their exclamations of delight that the fuchsias have again outdone themselves, and our labor has been worth while.

This plastic shell-house, built by Mr. and Mrs. C. Erwin Ross, accommodates fuchsias and other summer-flowering plants.

Fuchsia 'Swingtime'.

Fuchsia 'Cascade'.

With our expanded collection, we now have the sad task each year of eliminating some varieties to make room for the tempting new varieties which hybridizers release. Not all fuchsias will grow to perfection for us even with expert care. Some varieties are not suited to our climate, some we do not like because of their particular habit of growth or type of bloom. These we do not mind discarding, but even with the elimination of the undesirables we have suddenly found ourselves "fuchsia happy," and our list keeps swelling beyond a reasonable number to handle comfortably.

Hanging Fuchsias

The flower of the fuchsia always confused me because the sepals look so much like petals. I had difficulty remembering that the center part is the corolla composed of the petals, which are sometimes double or single, and the outer part, usually of a different color, is the calyx or sepals. Protruding from the center of the perianth (corolla and calyx) is the pistil surrounded by the stamens; these are usually the same color as the tube, which is formed by the union of the sepals.

In habit of growth, fuchsias differ greatly and are classified horticulturally in two groups, hanging or trailing and upright. Many varieties listed as upright are also excellent basket plants and are described as "stiff trailers," since the branches arch as they hang.

'Swingtime', perhaps the most popular trailing variety, was originated in 1950 by Tiret. It has a double, milky white corolla with upturned sepals of shiny red. Inside, the sepals are rose-red and of a crepelike texture. 'Swingtime' is an early bloomer with free-branching habit.

'Cascade', one of the oldest of modern-day fuchsias, introduced in 1937 by Dr. Legan, still rates as one of the best and most popular. It is a real trailer and bears masses of large, single blooms, the corolla deep carmine, the long pointed sepals white, flushed carmine.

'Jubilee', introduced by Reiter in 1953, has a double corolla in a beautiful 'American Beauty' rose. The sepals are long and spreading, white flushed pale rose. This is a strong, bushy grower and a good trailer.

'Angels Flight' is well named, for the overall effect is a fluttering of white and light pink. The double, white corolla has petals which are longer in the center, shorter on the outside; the tube is long and white, the sepals a deep pink. 'Angels Flight', an early-blooming and free-trailing plant, was introduced by Martin in 1957.

'Innocence', a remarkably early bloomer, with strong, bushy, slow-trailing growth, has nearly pure white, large, double blooms. All these qualities are seldom found in one variety. The general effect is of pure white fluffiness, although there is a crimson spot at the base of the sepals and on the tube. Small, pale green leaves add a subdued back-

Fuchsia 'Whitemost'.

Fuchsias 'Brigadoon' left; 'Flourescent', right.

ground to the mass of blooms. 'Innocence' was introduced by Reiter in 1952.

'Whitemost', introduced in 1942 by Niederholzer, is a most satisfactory and popular white and pink fuchsia. There seems to be a difference of opinion among growers on the description of the corolla. Our plants have a single, long, white corolla and pale pink calyx. It is a heavy bloomer, a good grower, and heat-resistant. 'Whitemost' is one of the best fuchsias for baskets.

'Streamliner', patented by Tiret in 1957 and one of the most striking of all fuchsias, has long, twisted sepals and a long, thin tube of deep crimson with a violet undertone. The corolla of the same shade is semi-double. 'Streamliner' is a natural trailer and a free bloomer.

'Brigadoon', a handsome, massive, stiff trailing plant, bears very large flowers. The double corolla is violet-blue, marbled with pink near the base. The recurved, long, broad sepals and tube are a bright rose-pink, the inside sepals of a crepelike texture. 'Brigadoon' blooms freely in summer and is heat-resistant. It was originated by Erickson in 1957.

'Ebbtide', originated by Erickson and Lewis in 1959, is a fine trailer with a large, double corolla of pale lavender and phlox-pink. The recurved sepals and tube are of light pink. 'Ebbtide' blooms freely in summer.

'Dr. Olson', introduced by Schmidt in 1959, is a good trailing plant and free-blooming, its flowers a fluffy combination of pale orchid-pink, purple, and salmon. As in 'Angels Flight', the center petals of the large, double corolla are surrounded by shorter, spreading, outer petals. The tube and upturned sepals are bright red.

'Cockatoo' is my favorite for a gay red and white fuchsia which can double as an upright or hanging plant. It branches naturally, blooms all season, and is remarkably heat-resistant. The flaring, double corolla is a clear white marked with bright red veins, the tube and sepals a deep rose-red. 'Cockatoo' was developed by Schnabel-Paskesen.

'Flying Cloud', which was originated in 1949 by Reiter, has stood the test of many years. It is considered an upright or stiff basket type. The entire flower is white with the palest rose tinting. One of the first really good near-white, double fuchsias, 'Flying Cloud' is strong, free-blooming, and heat-resistant.

'Fluorescent', a Walker and Jones 1952 creation, is also classed as a stiff basket type. Its beauty lies in the long, tapering, white sepals and the pastel lilac-orchid, semidouble corolla. It is strong, heat-resistant, and free-blooming.

'Mrs. Victor Reiter', a showy trailing plant, another Reiter origination (1940), is conspicuous because of its long, white tube and long, narrow, waxy white sepals. The single corolla is crimson, fading to white at the base.

'Swanley Yellow', really more orange than yellow, has extra long tubes and sepals of light apricot. The single corolla is a bright orange-pink. This is a good semitrailer.

All-white fuchsias are notorious for weak or other undesirable growth. We tried 'Lace Petticoat', a beautiful double, all-white flower, but found it difficult to grow. Then came 'Sleigh Bells', originated by Schnabel in 1954, with its long, white buds opening into beautiful bell-like, all white flowers; but its growth, though strong, is too tall, and it is a late bloomer. However, when in bloom, this is an eye-catching variety. After 'Sleigh Bells' came Schnaubel-Paskesen's 'Ting-A-Ling' in 1959, a free-blooming plant with masses of smaller, bell-like, all-white blooms, but the growth shoots out in all directions. 'Ting-A-Ling' is neither a good upright nor a good hanging plant, and unsuitable to the

Fuchsia 'Golden Marinka'.

Fuchsia 'Autumnale'.

Above. Fuchsia 'Mme. Cornelissen'.
Upper Right. Fuchsia 'Carmel Blue'.
Lower Right. Fuchsia 'Winston Churchill'.

cool, damp summers in Maine. The foliage blackens and drops spasmodically. We have yet to find the perfect all-white fuchsia; we prefer the near-white such as 'Innocence', 'Flying Cloud', and 'Whitemost'.

Three beautiful colored-leaved fuchsias for hanging pots or baskets are 'Sunray', 'Golden Marinka', and Autumnale'. 'Sunray', developed by Rurid in 1862, is considered an upright, but we find it will also trail. The leaves are very colorful—silvery white, green, cream, and yellow. The flowers have a single, rosy purple corolla and salmon sepals. 'Golden Marinka', an attractive trailer, was developed by Weber in 1955; it is a sport of 'Marinka' and has single red flowers and red stems. The leaves have irregular gold edges which turn to cream as the leaves mature. Because of the foliage contrast, 'Golden Marinka' should be included in all fuchsia collections. 'Autumnale' is the most striking colored-leaved fuchsia that I know. The new growth is the color of autumn foliage—red, gold, and brown; as it matures, the color becomes a russet-red. New growth should be pinched frequently, since the branches grow fast and long. The single flowers are purple and red.

As far as I know, there is no class of miniature or dwarf fuchsias, but there is a group of small-flowered varieties which, because of their smaller leaves and blooms, take up less space and make nice fillers between larger varieties. Generally they are hardier, more durable, and stand more abuse than the large-flowered kinds. *Fuchsia magellanica gracilis,* the hardiest of the group, makes a nice trailing or upright plant and bears an abundance of slim, red and purple blooms. We like it to edge the window boxes, for it gives an airy, fernlike effect between the stiff-branching varieties. This species from Chile is winter-hardy as far north as New York City. *F. magellanica gracilis variegata* is even more desirable, since the green and white leaves as well as the blooms are decorative. 'Papoose', originated by Reedstrom and more recently introduced, flowers profusely; the semidouble corolla is very dark purple, the sepals bright red. It is heat-resistant, a real gem as an upright or basket plant. One small-flowered fuchsia deserving more attention is 'Madame Cornelissen'. Not only is the maroon-colored foliage attractive, but the flowers are abundant and showy, a flutter of semidouble white corollas and bright red calyces. It grows nicely as an urpright pot or basket fuchsia.

Three petite-flowered fuchsias, in pink and white, are: 'Countess of Aberdeen', the smallest, originated by Schneewitchen, has dainty, very small, waxy white flowers, tinted pink, and is a bushy, prolific bloomer. 'Mme. Dacheau', an old favorite, is also very small-flowered, but slightly larger

than 'Countess of Aberdeen', the single corolla a coral-pink, the calyx white. It is a strong-growing, prolific, and heat-resistant variety. 'Mrs. Marshall', the largest of the trio, has clear pink petals and pure white sepals.

'Little Beauty', an old timer and one of the most popular of the small fuchsias, is the only fuchsia in our collection that could be considered a dwarf; it seldom grows more than twelve inches high. The single flowers are violet-purple and red.

Upright Fuschias

For porch or patio, upright fuchsias are ideal for growing in pots. They can also be tucked in shady foundation plantings, in shady borders, and used as pot plants in a window where few other plants will flower.

'Carmel Blue' has a long, single corolla which opens to a beautiful violet-blue and turns to a wine color as the flower fades. The sepals are white, the tube long and white. This prolific bloomer was originated by Hodges in 1956.

'Pink Fairy', a Waltz creation of 1954, is strikingly beautiful. Not only are the foliage (light green) and the self-branching habit of growth desirable for a pot fuchsia, but the large flowers are of that exquisite soft pink so many gardeners cherish. The large, double petals, and the broad, upturned sepals give the effect of a ballerina dressed in light pink. 'Pink Fairy' is self-branching, slow-growing, and confines itself nicely to a pot.

'Perky Pink', developed by Erickson and Lewis in 1959, is an all-pink which some growers prefer as it is a fast-growing, bushy plant, easy to propagate, and a prolific bloomer. The large corolla is white with a pink flush and pink veining; the short, broad, pink sepals have green tips.

'Pink Cloud', another Waltz creation of 1956, is distinctive for its long, tapering, single, all-pink blooms of extra large size. It is a tall, strong grower. 'Pink Cloud' is beautiful as a background plant with lower pot fuchsias.

'Winston Churchill', originated by Garson in 1942, continues to be one of the top favorites for an almost perfect pot plant. No other variety so far equals its strong, bushy growth, its prolific blooming habit, and the appealing color combination of its "right-sized" blooms. The double corolla is purple-pink, the calyx bright rose.

Culture of Fuchsias

Fuchsias are shade-loving plants, but require some sun and plenty of fresh air. Early morning sun or filtered sun as provided by a lath house, a shaded porch or patio, or under trees, is best. The plants should be placed outdoors as soon as danger of frost is past, and should be sheltered from strong winds.

Fuchsias thrive in rich light soil with good drainage. A satisfactory mixture is made up of equal parts of peat moss, leafmold or compost, loam, well-rotted cow manure, and sand. In the absence of leafmold, compost, or rotted manure, use one-fourth part of dried cow manure or a five-inch pot of bonemeal to each bushel of peat moss, loam, and sand.

When fuchsias are established in the late spring, they should be fed with a well-balanced fertilizer every two weeks. Some growers feed their plants every week during the blooming period, alternating between a balanced commercial fertilizer, such as a 4-12-4 formula, and an organic fertilizer, such as liquid manure or fish emulsion. The feeding is discontinued in early fall.

Proper watering is the secret of success with fuchsias They should never get completely dry, even when resting; on the other hand, they should never become water-logged. During warm weather the plants benefit from having their leaves syringed with water. This should not be done when the sun is shining directly on the leaves, to avoid burning them.

Insects and diseases of fuchsias are not difficult to control. Regular spraying with a reliable insecticide, such as lindane, rotonone, or pyrethrum, is recommended, since red spider, aphids, and white flies may attack. Spotting or premature dropping of leaves usually results from an atmospheric condition—too hot, too cold, or too dry—or from lack of fertilizer.

Fuchsias root best in winter and early spring, when their buds are not forming, in any good rooting medium, such as sand, vermiculite, or perlite. Cuttings should preferably be taken from new growth below a node; old growth will also root, but may take longer. The cuttings must be kept moist, in shade, and at 65° to 75° temperature. When they have rooted (in about three weeks) they are then put into two-and-a-half or three-inch pots in light sandy soil. A cool, shady place should be provided for the young plants during the summer. It is possible to root cuttings at any time of the year, but during hot weather it is more difficult.

When the plants are six to eight inches high, the center is pinched to induce side shoots. (And continue to pinch the center of new growth until the desired bushiness is obtained.) Since fuchsias grow rapidly, plants in two-and-a-half-inch pots should go directly into four-inch pots and plants in four-inch pots to five- or six-inch pots. (Do not repot much deeper than the depth at which the plants have been growing, for the roots lying near the top may be smothered.) After each potting, the plants are watered sparingly for a week or ten days or until they show signs of renewed growth. The hair-like roots must reach out and establish themselves in the new soil; too heavy watering will wash off the tips of these tender roots. For drainage, pebbles or broken crock should be placed in the bottom of pots four inches in size and up. If they are properly fed and watered, fuchsias can be grown well through one season in pots no larger than six inches.

Moss-lined wire baskets are attractive for the hanging types when they are grown out-of-doors, in the greenhouse, or in the lath house. A ten- or twelve-inch basket containing three to four plants makes a beautiful specimen. Small plants from two-and-a-half-inch pots can be planted in the basket, or larger plants from four-inch pots.

Fuchsias, to be used for propagation or grown on another year, should be brought indoors in the fall before frost. If the humidity and light are good, it is possible to carry them over the winter in the window garden. However, it is more likely they will drop their foliage and go into a semidormant state. They can then be stored in a well-lighted, cool cellar or under the benches in a cool greenhouse, their branches being cut back to about eight inches and old growth thinned out. The new growth, which will develop in February or March, should be pinched back when

two or three sets of leaves develop. When frost is no longer likely to occur, the plants can be placed outdoors to be grown again to specimen size.

It is interesting to grow fuchsias in shapes other than bush or hanging. The tall-growing and basket fuchsias can be trained as espaliers against a wall or as tree-fuchsias. Since the season in Maine is short and the problem of winter storage for large plants is acute, we have not tried growing fuchsias in this manner, but we have seen it done and noted the procedure. The method of growing espaliers and tree fuchsias is more or less similar. For an espaliered fuchsia, four to six branches are trained against a wall or trellis, with all side shoots pinched off. For a tree-fuchsia, only the center stem is trained on stakes; the side shoots are pinched off, but the leaves remain. When the main stem has reached the desired height, usually three or four feet, the center is then pinched and a wire frame or inverted twelve-inch basket is anchored to the top of the stake to support the new growth. The new growth is then pinched once or twice and trained over the wire frame. When in bloom, the tree fuchsia looks like a beautiful basket fuchsia on a pedestal.

GROWING CHRYSANTHEMUMS FROM SEED

This white spider chrysanthemum, raised from seed by the author, received an award at the national show of the National Chrysanthemum Society, Inc., U.S.A. in Washington, D.C., October, 1962.

By

CORNELIUS ACKERSON

Mr. Ackerson is Editor of *National Chrysanthemum Society Bulletin*, official publication of the National Chrysanthemum Society, Inc., U. S. A., and author of *The Complete Book of Chrysanthemums*, published by Doubleday.

The following is adapted from his article in a recent issue of *National Chrysanthemum Society Bulletin.*

NO TWO FLOWERS from different seedling chrysanthemums are exactly the same. While seedsmen are constantly striving to develop strains of annuals and of some perennials with better, identical flowers, no commercial seedsmen in the United States are producing seeds of chrysanthemums for amateur gardeners. Thus the chrysanthemum hobbyist is compelled to do his own hybridizing or to obtain seeds from a foreign source. Perhaps the best source is the Seikoen Garden in Kanemaru Asinagun, Hirosimaken, Japan, whose ball-shaped, spider, and single or Ichimonji types of blooms have been developed through controlled hybridizing so that they come relatively true to form. This does not occur when hybridizing is done haphazardly.

The chrysanthemum is a perennial, but its growth from seed is like that of an annual, for if the seeds are sown in early spring, the plants will bloom the same fall. This factor and the other important factor that hybridizing has been going on some twenty-five hundred years or more, ever since Oriental plantsmen discovered the chrysanthemum, have created a great potential for variation in this branch of the Composite Family. Every characteristic of the two plants used in a particular cross is merged in the gene pool —of course, any one of them may be recessive in the first-generation progeny.

In operating my greenhouse, I found it necessary to reduce as many tasks as possible by automatic methods. Watering, heating, ventilating, and controlling the humidity were comparatively easy to make automatic through electric devices, but germinating seeds and raising seedlings were not so readily controlled by automation. Small seeds which are slow in germinating require considerable attention when it comes to watering; and, unfortunately, in my greenhouse algae often appear on the surface of the growing medium before the seeds sprout. Then, once the seeds have germinated, the seedling plants must be given the proper amount of water at the proper time, or they will die. All these tasks took more time than I could afford to spend, so I had to consider ways and means of meeting the problem.

After trying out various mediums for seed germination, I decided that good soil, enriched with compost and sterilized, gave the best seedling growth. The so-called inert materials furnish no food to seedlings, and any added fertilizer may or may not supply the right ingredients. (To sterilize the soil mixture, I put it in a pail in the oven for several hours at a temperature of 350°F.)

I have used small wooden flats, commercial peat market packs, and other containers. Some containers require a thorough watering when the seeds are sown and then again when the seeds have germinated; others are provided with some type of automatic watering device. Any of these seed flats generally work well with seeds which germinate quickly, but with those that take three weeks or more for germination, algae frequently appear before germination occurs. Fortunately, I came upon a plastic tray which holds twenty-four two-inch pots in such a way that watering can be done from a reservoir below and the bottoms of the pots barely rest in water. To prevent algae growth, the whole "Port a Planter" unit is enclosed in a clear plastic bag. The seeds can be left for three weeks or more without further attention, unless they should germinate quickly and become spindly in the high humidity of their plastic "greenhouse."

Any porous container can be used for sowing chryanthemum seeds, provided the soil is well watered before the container is enclosed in a plastic bag. The seeds usually germinate in ten days and are transplanted any time after they are large enough to be handled easily without being injured.

Chrysanthemum seeds are like tiny sticks of dry wood about an eighth of an inch long, thus it is not difficult to space them about half an inch or more apart on the surface

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TAMING THE PENSTEMON

By GLENN VIEHMEYER

Mr. Viehmeyer is Assistant Professor of the Horticulture Department, College of Agriculture, The University of Nebraska, North Platte. His work with penstemons has been receiving considerable notice.

WHEN THE EDITOR of *The Garden Journal* invited me to tell you the penstemon story, I was at a loss how to go about it. The field is so big and so new; there are so many possible approaches that even outlining what I should like to tell you is complicated. To tell the whole story would require far more space than is allocated for this article. There is a story of penstemon as a research tool; a story of penstemon as an ornamental; a story of the genus and its distribution; and a story of a group of people who are trying to domesticate this genus of showy wildings and synthesize from them acceptable garden ornamentals.

Perhaps I can include a little of all these aspects in a single story which, I hope, will interest you and make you want to try this plant in your gardens.

If my own experience is any criterion, the name *Penstemon* means nothing to most gardeners. Common names mean little, except to local people. Here in central Nebraska penstemons are called "bluebells" or "wild foxgloves"; in the southwest desert, they may be called "scarlet bugler." In other places "beard-tongue" and other names are used, so the initial problem becomes one of communication, of telling the story so that you will know what I am talking about.

Let me begin by telling you that the penstemon is related to the well-known snapdragon and is a member of the Figwort Family or *Scrophulariaceae.* However, it is far more diverse in morphology (form and structure) than the snapdragon, and this makes it possible to select forms for almost any garden use. There are tiny penstemons which make good rock-garden subjects, there are penstemons for the low border, and giants for the tall border. In color they range the spectrum, good reds, blues, purples, a few yellows, and all imaginable intermediate colors. As pure species, they are distributed from the Arctic to the Tropics, from seashore to alpine meadow, from humid climates to deserts.

PENSTEMON AS A RESEARCH TOOL

Species exist as discrete entities because of what the evolutionist calls "reproductive isolating mechanisms." These mechanisms prevent species from crossing under normal conditions. This may be the result of geographical isolation, where space prevents cross-pollination, or of genetic combinations which prevent the fertilization of the ovules by foreign pollen. Where species share a common range, genetic isolation (which takes many forms) allows the species to maintain itself as a distinct entity. If species have separate geographical ranges, space prevents crossing.

The plant breeder who wishes to cross distinct species must find a means of circumventing isolating mechanisms. If the barrier is spatial, the problem is only one of bringing the species together; but if the barrier is genetic, means of inactivating or circumventing the isolating mechanisms must be found. A beginning has been made, thus far over thirty species belonging to five sections of the genus have been hybridized to form a reticulum of interfertile hybrids. Much remains to be done, for there are over three hundred species and forms of *Penstemon* which the breeder may use.

Penstemon Henry Hybrids.

PENSTEMON AS AN ORNAMENTAL

Bringing a genus of wild plants into domestication is an ambitious program, but this is what is being done with *Penstemon.* Pure species are seldom satisfactory as garden plants, unless their native habitat is closely simulated. There are some exceptions. *P. digitalis,* for example, seems to do well in gardens across the country.

One of the greatest difficulties with the showy montane and desert species is their susceptibility to disease in the garden. In humid climates such species seldom behave as perennials; they bloom once and die, reacting as biennials. This habit counts against them and may be the reason for their limited use in eastern gardens.

This statement is not intended to discourage attempts to grow pure species, rather to point out difficulties you may encounter in growing any plant under conditions to which it is not adapted. By all means include species in your plantings. Start with the "easy" ones, and as you learn and become experienced, move on to the difficult things which try your skill as a gardener.

If you live in the Pacific Northwest, along the Great Lakes, or in New England, you should try to grow the shrubby, evergreen species belonging to the subgenus *Dasanthera.* These little shrubs are exquisite in the rock garden

or for naturalizing on rocky banks where there is lean soil and cool root-runs. Roy Davidson of Seattle, Washington, has collected a wide range of forms from the Cascade and Rocky Mountain systems and has made seeds available through the seed exchange of the American Penstemon Society. In the plains these penstemons are "downright tricky." I do manage to keep a few of them alive by special care and protection, but they require a lot of attention.

If you live in the plains and prairies, you should try *P. grandiflorus, P. cobaea, P. strictus, P. unilateralis,* and others of the plains and foothill species. Grown on a dry bank in full sun, these give a wealth of blue and purple blooms. You should also try some of the desert kinds in the very driest sites of your garden. If the soil is very sandy, you will want *P. ambiguus* whose pink and white phloxlike flowers continue bloom for a long time.

There are a number of little rock plants in the *Ericopsis* group which are treasures. In fact, you who live on the plains have a greater choice of species than do dwellers in any other section of the country.

If you live in dry desert climates, you will want to grow the bright species of the *Pelanthera* group, *P. clutei, P. palmeri, P. spectabilis, P. pseudospectabilis,* and the little species of the *Ericopsis* group. These flourish in the dry hot climate of the semidesert but may fall victims of disease in the more humid parts of the country.

In the humid East, the backbone of any species planting should be *P. canescens, P. digitalis, P. smallii, P. ovatus,* and *P. hirsutus.*

Since we have learned how to make interspecific hybrids and to grow advanced generations of these hybrids, a different picture is emerging. Hybrid populations segregate for adaptiveness, and some of the recombinations in these segregating populations are far better adapted to garden conditions than are the parental species. It is in these better-adapted individuals that we are most interested. We can breed for greater adaptation just as we can breed for better flowers or better plant habits. Even though the work with penstemons is just beginning, we have developed some excellent garden kinds, and I am certain that as time passes,

Penstemon Flathead Lake Hybrids, also known as Indian Jewels.

Penstemons 'Prairie Fire', left, 'Prairie Dusk', right.

breeders will produce a whole series of valuable garden ornamentals.

At present I recommend growing seedling populations of the hybrids that have been produced at North Platte and elsewhere. Here at the North Platte Experiment Station we have a limited amount of hybrid seeds, and I shall send a packet to any reader who sends a stamped, self-addressed envelope. I shall also send a free copy of the bulletin *Penstemon in Your Garden* to those who request it. Those who wish a wider selection should join the American Penstemon Society. Membership gives access to the Society's seed exchange, which lists a hundred species and twenty-five of the newer hybrid strains. (One may join the society by sending two dollars to Mrs. E. A. Boyrie, 614 Macleay N. W., Portland 10, Oregon).

Most penstemons require full sun, and all require good drainage. They need enough room in which to develop and to have free air movement about them. Good spacing and well-drained soil minimize disease problems. If the flowering stems are cut just below the lowest flower-cluster as soon as they have finished blooming, many hybrids will continue to bloom throughout summer and fall.

Once you have grown a population of hybrid penstemons, choose those that do best in your garden as a source for seeds. By so doing you will take part in the fascinating game of taming a wild plant and molding it to man's use.

Today's complex hybrids are a real "grab-bag" of new ornamentals if their seeds are sown. From such seeds come a fantastic array of new types—no two will be alike. You select the ones you like best and increase them by divisions or cuttings. You may even want to try your hand at hybridizing. I hope you do, for it affords a satisfaction which no other phase of gardening equals.

Penstemons Now Available

The seed exchange of the American Penstemon Society is the largest source for seeds of both the pure species and

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Left, red flower and coral bean of the coral-tree and, right, dull red blooms with yellow stamens of the "tree of the little hands," both from Helen O'Gorman's *Flowering Trees* and *Plants of Mexico*.

MEXICO'S PLANTS

By PHIL CLARK

Mr. Clark, before joining the staff of The New York Botanical Garden in November, 1962, as Assistant to the Director (Public Relations) spent ten years in Mexico, writing and lecturing on horticultural subjects, and is well informed on the wealth of plants in that country. He will conduct a Mexico-Guatemala Garden and Wild Flower Tour in October, 1963.

A VAST NATURAL botanic garden in a setting of fantastic contrasts describes the Mexico that awaits the gardener, the student of plants, or the traveler south of the Rio Grande. And it explains why from the first Conquistadores who came with Cortez, visitors to Mexico have been fascinated by the country's wealth of plant resources.

Every important plant category is represented in Mexico. Would you believe that Mexico has one hundred and twelve different species of oaks to eighty-four in the United States and ten in Canada? Or that there are over six hundred native kinds of orchids? More than half the world's cactus species? More species of palms, and surprisingly, of pines in Mexico than on the rest of the North American continent? And an estimated twenty-thousand species of plants, equal to the number in the United States, which has more than four times the land area?

Mexico's bird population is amazing, too. The country has one thousand species and 2,350 subspecies (as against 535 species which reside in or visit the United States and Canada). Four hundred and ten species breed in the State of Veracruz alone—and another one hundred are regular visitors to that state.

In a country of such contrasts in climate and terrain, it is well to know where to look for plants. Orchids are found in the southern and coastal states; the most beautiful flowering trees are generally distributed in the same areas.

Flowering bulbs can be found in almost all sections, especially in the rocky or desert zones. Cacti abound in the arid sectors, mostly in the north, though there are also cacti which grow only in tropical places.

Annuals and perennials have been spread with a lavish hand all over the Republic, with particularly colorful late summer and fall displays in the mountainous areas surrounding Mexico City.

The most dramatic "south-of-the-border" floral display is supplied by the flowering trees and shrubs. In early spring the coral-trees *(Erythrina americana)* flaunt their pyramids of flame-colored flowers from gaunt, leafless branches. They

make an impressive boulevard show at the National University, and they are also to be seen in all hot-country Mexico —in Cuernavaca, in Veracruz, and approaching Taxco and Acapulco.

Besides the familiar red coral-tree *(Erythrina americana)* there are others for which the name *Erythrina* better applies than coral-tree. There are white and flesh-pink ones *(E. carnea)* in Veracruz along the roadside just beyond the village of Acultzingo as one ascends the mountain of that name. On the waterfront boulevard at Acapulco another with flowers a dusty old rose *(E. occidentalis);* an orange-flowered one on the highway just north of Taxco *(E. mexicana).* There is a shrubby, three-foot, coral-tree cousin *(E. leptorrhiza)* revealing pale red flower patches along the Amecameca highway, in mid-July, and a ten-foot red erythrina *(E. breviflora),* flowering in September, along the San José Puruá highway and on the hillsides which rise from the new highway to Cuernavaca.

Flowering at the same time and in the same areas as the familiar coral-tree is the jacaranda with its showers of soft lavender-blue trumpets usually borne on bare branches before the unfolding of the fernlike leaves. Though widespread, this is a plant immigrant from Brazil.

A plant oddity which bears spring blooms in the Pedregal lava fields south of Mexico City is the aptly named palo loco or crazy stick *(Senecio praecox).* The ungainly, clublike trunks are crowned by giant clusters of the yellow daisies typical of the senecio tribe. The fragrant, yellow, fuzz balls of acacia and the sweetly scented, white chalices of magnolia *(M. grandiflora)* and *Talauma mexicana* bring added magic to springtime in Mexico, both temperate and tropical.

Spring displays an even more colorful range of flowering trees in the hot country. Probably the most beautiful is the tabebuia. Yellow-throated, pink trumpets mass on a tree which sometimes reaches seventy-five feet. It has a five-part leaf. Tabebuia grows wild along the Acapulco highway beyond Chilpancingo or near the city of Valles, in a warm valley on the Mexico-Laredo highway.

A strange tropical beauty is the bombax, descriptively known as the shaving-brush tree because of its giant, pink or white brushlike stamens puffing out from reflexed petals of the same hue. The flowers are all the more striking because borne on naked branches. An immense relative with huge, ivory petals and white stamen masses is the pachira, hugging the water's edge in the impressive tropical country near Lake Catemaco, Veracruz, and along the rivers near Tecolutla, in the same state.

The wild cotton-tree *(Cochlospermum vitifolium)* bears large, yellow, poppy-like flowers from spring into early summer. The trees have been planted in the Córdoba, Veracruz, square and in residential and hotel gardens in Acapulco. They grow wild in Guerrero, Veracruz, Chiapas, and Yucatán, as well as in hot-climate zones farther north.

Of the thirty Mexican cordias, the small tree with orange flowers *(C. sebestena)* growing wild in Yucatán, and cultivated in Cuernavaca and elsewhere in the hot country, offers the most vivid color. A white cordia *(C. boissieri),* with the papery, funnel-shaped flowers typical of the genus, grows as a low shrub in the flats surrounding the Monterrey airport.

Certainly the most spectacular of the orange spring-flowering trees is the royal poinciana, with its butterfly-like

Angel's trumpet tree *(Datura candida)* from the Andes has gone wild in semitropical Mexico.
Photo taken in the mountains near Jalopa, Veracruz.

blooms, orange with a tracery of yellow, and feathery leaves. Native to Madagascar, it is planted in municipal plazas all over hot-country Mexico and has escaped in several areas. There is a grove of unusual splendor at the Hotel Vista Hermosa, just south of Cuernavaca, and a handsome planting borders the municipal square at Valles.

Frangipani, fabled as a source of perfume, grows wild on the hills near Taxco—its giant, rose-red cups, borne on knobby, leafless stalks, are an exciting surprise glimpsed from the highway in spring. A white species bears its flowers, with leaves, in summer in Veracruz and Guerrero. Forests in the same hot-country hills also feature the yellow oleander *(Thevetia thevetiodes),* not really a relative of the red, pink, and white Mediterranean native which is a popular garden plant in Mexico. There are particularly handsome displays on the hotel grounds in the spa towns of Tehuacán, San José Puruá and Ixtapan de la Sal. Another garden plant of note is the angel's trumpet tree *(Datura candida),* from the Andes, which produces its foot-long, pendent, white trumpets in both temperate and tropical Mexico.

Among later-blooming trees are the Mexican poincianas, closely related to the royal poinciana, with showy masses of yellow or orange flowers. They include a red-stamened, yellow species which the Texans call huisache *(P gilliesii)* and other species scattered from one end of hot-country Mexico to the other.

Cuernavaca and hot-country gardens are perennially aflame with the huge chalices of the African tulip-tree *(Spathodea campanulata),* another imported but completely naturalized plant. Its brilliant orange blossoms, daintily edged and throated in yellow, are proudly borne at the tree top.

Almost any summer or fall roadside boasts its show of gold from cassia or from yellow elder *(Stenolobium stans),* both as ubiquitous as they are lovely. The butter-yellow blooms of yellow elder are slipper-shaped and borne in sprays. The leaves are compound. The plant is a woody shrub in most areas, but a large tree in the tropics. The cassias come in all sizes from low herbaceous plants to small trees. The bright yellow to salmon flowers, depending on the species, are single or many-petaled. The compound leaves and beanlike pods announce the cassias to be members of the Legume Family.

The well-named hair flowers *(Calliandra anomala)* are to be seen in low, shrubby mountainside growth in most parts of Mexico in summer and fall. The flowers are composed of long, hairlike strands of deep red stamens, which the Mexicans, with a vividly descriptive sense, call *cabella de angel* or head of the angel.

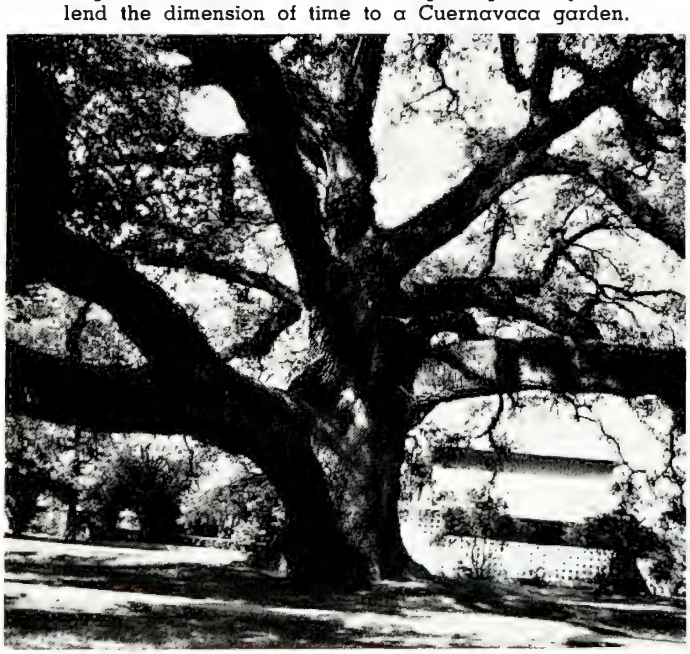
Another flash of red along the roadside comes from the bright scarlet shrub salvia *(S. sessei),* with a serpent's-head corolla protruding from a baggy, red calyx. The plant reaches thirteen feet on the mountain shoulders rising from the new Cuernavaca highway or in the ditches on the San José Puruá road. Other woody Mexican salvias come in oranges and woolly purples.

Flowers of the strange "tree of the little hands" *(Chiranthodendron pentadactylon)* are blood-red, five-fingered claws. The tree grows in both tropical and temperate Mexico —a flourishing example flowers every winter in Chapultepec Park. The bloody little hands are displayed in markets, even in such sophisticated centers as Mexico City, on sale as a heart remedy!

Another winter-bloomer is the morning-glory tree *(Ipomoea arborescens)* which grows in the dry stretches just east of Cuernavaca, on the road to Cuautla, and in the arid canyons south of Izucar de Matamoros. The bone-white branches hold large, white, sometimes deep rose-centered morning-glories.

Another dramatic woody plant is the tree daisy *(Montanoa grandiflora),* often as tall as fifteen feet and in fall covered with masses of yellow-centered, white daisies. There is a chrysanthemum-like double form, usually smaller in stature.

The gracious lines of an ancient tropical plum, *Spondias,* lend the dimension of time to a Cuernavaca garden.



A number of species of Cecropia grow in tropical Mexico. This, C. *mexicana,* in southern Veracruz has a silvery reverse to its leaves.

Mexico's fruit trees offer their own special beauty . . . and flavor. One will find the familiar apples, pears, apricots, peaches, and plums of the temperate zones, the best of which are grown on the cooler mountain slopes. But it's the tropical fruits which are most exciting: mango with golden fruit hanging from deeply green, giant trees; the fragrant citrus; the many species of avocado—some bearing immense, green ovals, others small, black-skinned globes; figs with beautifully cut leaves; the twisted, gray-leaved olive trees; pomegranate sporting large, swollen, red flowers and green, tennis-ball-sized fruits, split and displaying juicy, red seeds; banana, custard-apple, zapote, papaya, coffee, and mammee-apple; guava with fragrant, pale yellow fruits borne on yellow-barked, smooth branches; the shapely tropical plum *(Spondias purpurea)* with red-flushed yellow, acid fruits; and tamarind with feathery leaves and long, brown beans.

One of Mexico's trees valued for fruit, flower, and shape is the tejocote *(Crataegus mexicana)*—giant cousin of the northern hawthorne. A spreading tree with gold fruits turning red, about golf-ball size when mature, it is distributed in both temperate and semitropic areas.

Shade and forest trees merit a word. Among the most impressive is the immense ash *(Fraxinus uhdei)* that shades Mexico City's gracious Reforma; the pines, oaks, firs, and junipers of the mountains; the myriad palms, including coconut- and date-, of desert plains and tropical jungles; Indian laurel trees *(Ficus retusa)* with spreading branches so vast as to cover whole village squares with their dark green canopies; giant ceiba (from which kapok comes), mahogany *(Smietenia mahogani)* and chicle *(Sapota achras)* of tropical forests; the stunted, tortured and thorny mesquite, mi-

A butterwort, *Pinguicula* sp. its white petals edged with blue, was found by a Cactus Society of Mexico group on a river canyon-side near Zimapan.

mosa, and acacia of the desert foothills; the towering Portuguese cedar *(Cupressus lusitanica)* in the gardens that were once those of the Conquistadores themselves in Coyoacán; twisted Peruvian pepper *(Schinus molle);* giant-boled, peeling-barked eucalyptus; yuccas sporting great white flower-clusters and bayonet-leaves; and tall cottonwoods *(Populus wislizenii),* all typical of the dry plateau areas. The list could not close without special mention of the ancient Montezuma cypress *(Taxodium mucronatum),* some in Chapultepec Park from Aztec days, with feathery, light green leaves; and the storied "Tree of Tule in Oaxaca," a gigantic Montezuma cypress an estimated five thousand years—the oldest living thing.

ANNUALS AND PERENNIALS

The shoulders of Mexico's late summer and early fall roadsides are natural floral borders which unroll Persian-carpet loveliness for miles. Many flowers in these wild displays look familiar, for a large part of the garden stand-bys around the world originated in Mexico.

Along the Texcoco-Huamantla highway one September day, I picked at one stop: pink cosmos, yellow cosmos, orange and pink dahlias, marigolds in three species, white and yellow Mexican poppies, scarlet bouvardia, blue and red salvias, blue lupines, a small red zinnia, and a mauve-pink hollyhock-cousin, *Anoda cristata.* Such a collection is not unusual.

And while some areas are impressive for their variety, others offer masses of flowers of one kind. Fields edging the pine forests along Cortez Pass, between snow-capped Mount Ixtaccihuatl and Mount Popocatépetl, are blue with waist-high lupine spikes in early summer. Yellow tithonias, some ten feet tall, turn autumn fields and roadsides south of Mexico City gold. Roads near Puebla and Guadalajara pass fields pink with cosmos. Golden streams of ground-hugging bidens and creeping zinnia *(Sanvitalia procumbens)* pour down mountainsides north of Oaxaca City. Fields in both tropical and temperate Mexico are blanketed with white or yellow Mexican poppies in spring. Dwarf marigolds *(Tagetes lunulata)* flood the craggy volcanic rock of the Pedregal with gold in October; in the same season the underbrush in Veracruz jungles is tawny yellow with the birdlike bracts of lobster plant *(Heliconia latispatha)* and the hillsides of Chiapas, southern Oaxaca, and Guerrero are scarlet with poinsettias.

Several beauties often group together for brilliant late summer and fall pictures: cardinal salvia, with vivid flame blooms shaped like angry serpents, their stamen tongues protruding; a furry blue salvia; orange, yellow-lipped *Lobelia laxiflora,* its blooms nodding on individual stems; ageratum with its blue fluff balls; white or pink eupatorium with similarly fluffy flat heads; and yellow, daisy-clusters of

A field of native cosmos near the City of Puebla moves in pink eddies as breeze stirs the graceful plants.

the senecios, including one species *(S. salignus),* which flowers most of the year and resembles goldenrod. This plant community lays a gay serape of color along the new highway to Cuernavaca.

Then there are plants which reach out of the woodland or prairie like a loud, clear cry, commanding attention by their vivid hues. Along the Mexico-Laredo highway, the flame-orange lantana drapes the roadside ditch, and white lantana grows in the same area, its circles of small flowers on pungently odorous, shrubby plants. The pink variety grows in southern Mexico and is a common roadside plant near Cuautla and Izucar de Matamoros.

CLOUD FOREST

In the cloud forest near Villa Juárez, Puebla, a graceful little plant with a haze of pink flowers grows under the pines. It is *Fuchsia microphylla.* Another fuchsia rambles over the walls of canyons—*Fuchsia fulgens,* with very long, red-orange, green-tipped floral earrings hanging from its vinelike branches. This blooms in summer in the canyons near Valle de Bravo, Mexico, or in similar areas of Michoacán and hot-country Veracruz and Chiapas.

Five-foot spikes of purple penstemons may be seen in the fields and pine forest on the highway up to Cortez Pass. The size of the individual blooms, the length of the spikes, and the intense grape-violet color will bring any flower enthusiast from his car to investigate. Other species of *Penstemon* are scattered through mountainous Mexico, in reds, purple-blue, and oranges.

In the mountains of Oaxaca, usually in upland meadows, scarlet spikes of oddly shaped blooms—puffy jugs two or three inches long, longer at the bottom of the spike, will attract notice. Similar, though smaller, yellow and orange spikes are found in the Pedregal. The latter plant is *Lamourouxia rhinanthifolia;* the red species is *L. multifida.*

A curiosity, resembling African violet in both leaf and bloom, is pinguicula. Mexico has a number of species, all larger-flowered than their modest northern cousin, in purples and purple-edged white. The plant is insectivorous and digests small flies and gnats trapped on its hairy leaves. It completely changes form in winter, becoming a little ball of shortened leaves, but spreads out into a soft-hairy rosette of pale green with the spring rains. The flowers rise on long, graceful stems from the rosette. The plants thrive in thickly wooded areas of high humidity—for example near the mountain lakes of Zempoala, south of Mexico City.

Another oddity is the unicorn-plant *(Martynia fragrans)* with clawlike seed pods. The flowers, appearing in summer and fall, are slipper-form, pink marked white, and exude a penetrating odor. Shrimp plant *(Beloperone guttata),* familiar as a pot plant in the United States, is another oddity, and like the unicorn-plant, common in the tropics. Its shrimp-brown blooms appear throughout the year.

Less exotic, but in its thorny way no less lovely, is the duraznillo *(Solanum rostratum)* which bears its pale yellow, peach-fragrant blooms on burned-over or waste land. A weed to the owner of the land on which the plant so happily squats and an enemy to the bare feet of little boys, it is general in its distribution. If anyone tries to smell its five-lobed, potato-like flowers, he should beware of the thorns.

Another thorny beauty is the thistle. You've known thistles, of course, but not like these leviathans, nor in these shades of orange and blue, as well as the common mauve-pink. You would be impressed by the flower size, sometimes four inches across. These, too, are general in distribution, though the large ones are more often found in the rich soil of mountain forests or tropical lowlands.

To be continued

TAMING THE PENSTEMON (Continued from page 129)

of the new hybrid material. Some of the seed-grown strains are:

The Flathead Lake Hybrids, which one firm calls Indian Jewels. These have, perhaps, the widest range of adaptation and are brilliant, coming in every hue of blue, purple, pink, and red, and ranging in size from those suitable for the low border to background plants.

The Fate-Seeba Hybrids are magnificent four-foot plants in a similar range of color, but of larger individual flowers. Two- to three-foot spikes of foxglove-like blooms tower above blue-green foliage. The blooming period lasts a month or more.

Most spectacular are the seed-grown Henry Hybrids from *P. cobaea* × *P. triflorus* in rose, pink, lavender, and purple. Individual flowers are as large as Canterbury-bells, and the dense spikes reach a height of two feet. (Plants and seeds of this strain are offered by the nursery and the seed trade.)

Two clones, selected from the North Platte Hybrids, are being offered by the nursery trade. They are: 'Prairie Dusk' with many two-foot spikes of deep blue-purple flowers on strong, upright plants. The basal foliage is almost evergreen and disease-resistant. 'Prairie Dusk' is readily increased by cuttings or divisions. It is also a good seed parent, producing many excellent seedlings in the red, blue, and purple range of colors.

The second clone is 'Prairie Fire', with bright scarlet flowers, as the name indicates, on spikes reaching to thirty inches. It blooms from June until frost, and it is disease-resistant. The basal foliage is evergreen in all but the most exposed situations. 'Prairie Fire' has shown its adaptability to varying garden conditions.

A number of new clones are being increased for introduction, and new seed-grown strains are in the making. If the hybrids live up to their promise, tomorrow's gardens will be graced by a race of perennials which bloom all summer long. The penstemon story is only beginning.

CHRYSANTHEMUMS FROM SEED (Continued from page 127)

of the soil medium. This gives them room to grow so that transplanting of the seedlings can be delayed until their roots are firmly established. Germination may range from twenty to seventy per cent or more, depending upon conditions which prevail during hybridizing and in subsequent handling. However, with seeds of chrysanthemums costing about two cents a piece, one can raise a number of plants at a very reasonable cost.

Once the seedlings have been transplanted, they quickly develop. Until they are six inches tall, they should be protected from strong sunlight and watered just enough to keep the leaves crisp during the heat of the day. Thereafter, they are treated as one treats a plant taken from a cutting.

THE DATE AND THE COCONUT
COMPARISON BETWEEN THEIR DEVELOPMENT

By THEODOR PHILIPP HAAS

Dr. Haas, who received his education at the Botanical Institute of the University of Munich, joined the staff of the Philadelphia College of Pharmacy and Science in 1942, where for nineteen years he was Plant Taxonomist and Curator of the College Museum. He retired in 1961. Dr. Haas has visited various parts of the American Tropics, the southern United States, and Hawaii in pursuit of his research.

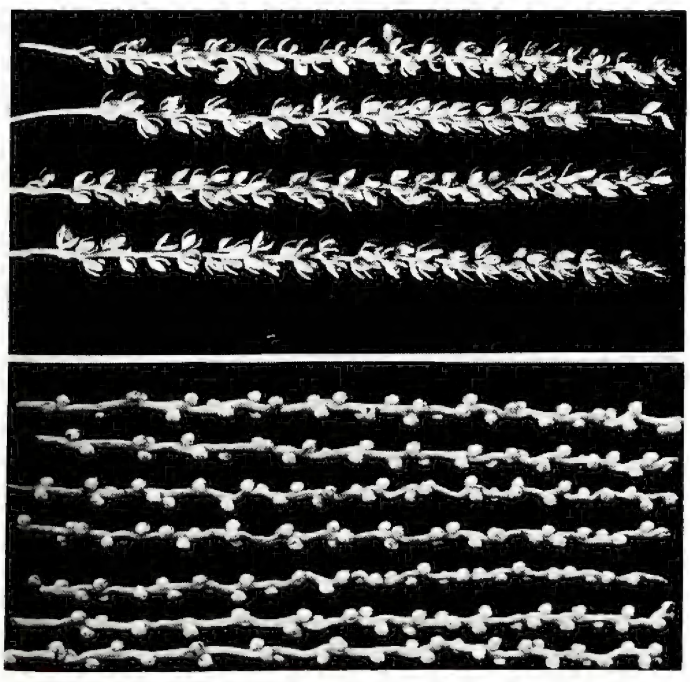
The following is adapted from the paper Dr. Haas presented before the Botanical Society of America during the meetings of the American Association for the Advancement of Science, held in Philadelphia, December, 1962.

THE DATE IS ONE of the oldest edible fruits. The cultivation of the date-palm *(Phoenix dactilifera*)*, the ancient "tree of life," goes back several thousand years in Mesopotamia, where the plant mainly originated. It is described by Herodotus (about 450 B.C.), Theophrastus (371-285 B.C.), and others. As with so many cultivated plants —wheat, for example—the wild state of the date-palm is not known. Unlike the coconut-palm *(Cocos nucifera**)* and the African oil-palm *(Elaeis guineensis)*, both also economically very important, the date-palm, geographically seen, is not a true tropical plant. Mesopotamia, Egypt, and North Africa, where the date-palm grows, are situated far north of the Tropic of Cancer.

The date-palm was introduced into the United States for commercial cultivation at the beginning of this century; the United States Department of Agriculture sent out plant explorers—among them, Dr. David Fairchild—to locate the finest date varieties. In 1960 I saw the date-palm cultivated on a small scale in the cloister-yard of the Benedictine Sisters in Tucson, Arizona, and in 1961 the large plantations in Indio, California, where the United States Department of Agriculture maintains a Date Field Station.

Herodotus tells us that the ancient people knew of two kinds of date-palm: one with male (staminate) and one with female (pistillate) flowers. The date-palm is dioecious;

Branches of male inflorescences, upper, and branches of female inflorescences, lower, of the date-palm *(Phoenix dactilifera)*.



Pollination of a female date-palm by an Assyrian god. Photograph by the author of a plate in the Metropolitan Museum of Art in New York.

the coconut-palm is monoecious, bearing male and female flowers on the same plant. The male flowers produce pollen only; the female flowers, when pollinated, the edible fruit.

The Mesopotamians, probably the early Sumerians, understood the sexuality of the date-palm and knew they had to transfer the pollen from the staminate to the pistillate flowers to prevent the young fruits from shrinking or dropping off and to be able to harvest a crop later on. As with so many other agricultural practices, the pollination of the date-palm was a religious act in Mesopotamia. The Metropolitan Museum of Art in New York City possesses large stone plates representing the pollination of a female date-palm by a winged Assyrian god. These plates are from Assurbanipal's palace (about 800 B.C.). According to Dr. V. Täckholm, artificial pollination must have come into use sometime later than the beginning of the cultivation of the date-palm, but it was practiced around 3,000 B.C. It is also mentioned in Hamurabi's code (about 2,000 B.C.). Artificial pollination started at the same time in ancient Egypt, with which Mesopotamia maintained trade relations (Middle Kingdom). In both countries the date-palm was a sacred plant, just as *Ficus religiosa* was and still is in India; there is a seal cylinder of *F. religiosa* from the Indus Valley civilization (about 3,000 B.C.).

The date-palm has a peculiar characteristic—it forms offshoots mainly on the base of the trunk. The Mesopotamians learned from experience that when these offshoots were planted, they developed the same kind of flowers, of the same sex, as the mother plant from which they had been

Left, date-palm with offset at base. Center, irrigation of date-palms at the United States Field Station in Indio, California. Right, fruiting date-palms with ladders permanently attached in Shield's Date Gardens, Indio, April, 1962.

taken. Since a single male date-palm furnishes enough pollen for about fifty female date-palms, the Mesopotamians planted only offshoots from fruit-bearing trees. If they had used the seeds, the date stones, it would have taken at least ten years for the plants to bear flowers—and fifty per cent would have borne staminate flowers, for which there was no use. Even today, in the oases in the deserts, the precious ground must be reserved for the palms that bear the fruit, a very important article of food and trade.

Offshoots were introduced into the United States fifty to sixty years ago. The variety 'Deglet Noor', which is the principal one cultivated in Indio, originated in Algiers. These first-introduced date-palms are now very tall trees—and still bearing fruit.

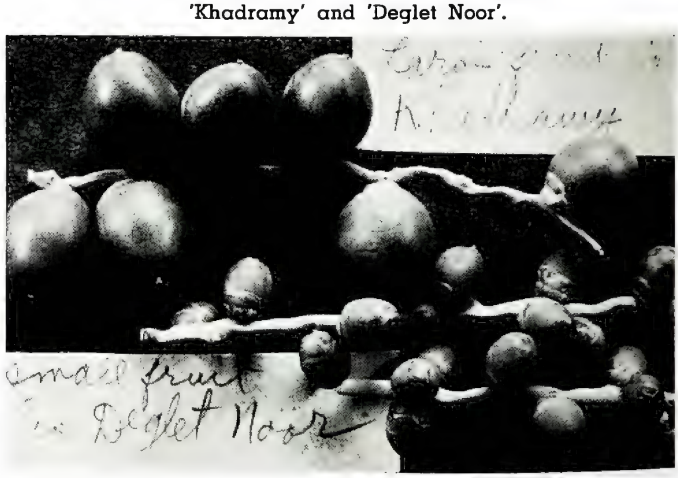
The date-palm is completely dependent upon man and would become extinct if he did not care for it. And it requires a great deal of care. It needs much water; it must be watered, in fact, several days a week. In Indio, the water supply for the irrigation system comes from the All-American Canal of the Colorado River.

In Arizona and California the date-palm blooms in February and March, the same months during which it blooms in Egypt. The female trees must be hand-pollinated. Late in spring some of the young fruits are removed from the infrutescences, because the tree is not able to nourish all the fruits adequately. This operation is called "thinning." In late August or early September, the infrutescences are covered with paper bags to protect the ripening fruits from birds and rain. Later in September and during the following months the dates ripen, not all at one time, however. Because of this, date growers must climb their trees frequently, and so a ladder is permanently fastened to the fruiting part of the taller palms. This ladder is reached from below by another ladder which is set in position temporarily.

I wanted to learn about the development of the date fruit, but found very little literature available. Baillon's illustrations in his *Histoire des Plantes* did not help. In March, 1961, the Benedictine Sisters in Tucson, Arizona, and in March, 1962, the United States Field Station in Indio, California, provided me with fresh male and female flowers. In April, 1962, I received young green fruits from the Field Station. While in Kailua-Kona, Hawaii, in July and August, 1962, I tried to compare the flowering of the date-palm with that of the coconut-palm. The date-palm differs from the coconut-palm—and also from the African oil-palm—in that it is influenced by the seasons: blooming in the spring, fruiting and being harvested in the fall. I was informed that in northern New South Wales, Australia, the date-palm, which was introduced there for commercial cultivation from California, has adapted to the reversed seasons. As previously stated, *Phoenix dactilifera* is a subtropical, not a tropical plant; *Cocos nucifera* and *Elaeis guineensis* are tropical, and they bloom and fruit the whole year.

The staminate flowers of the date-palm are trimerous (three-parted). The perianth is rather leathery and has three short leaves (sepals) and three longer leaves (petals) which completely cover the six stamens before the flowers open.

Young, unripe fruits of two varieties, 'Khadramy' and 'Deglet Noor'.

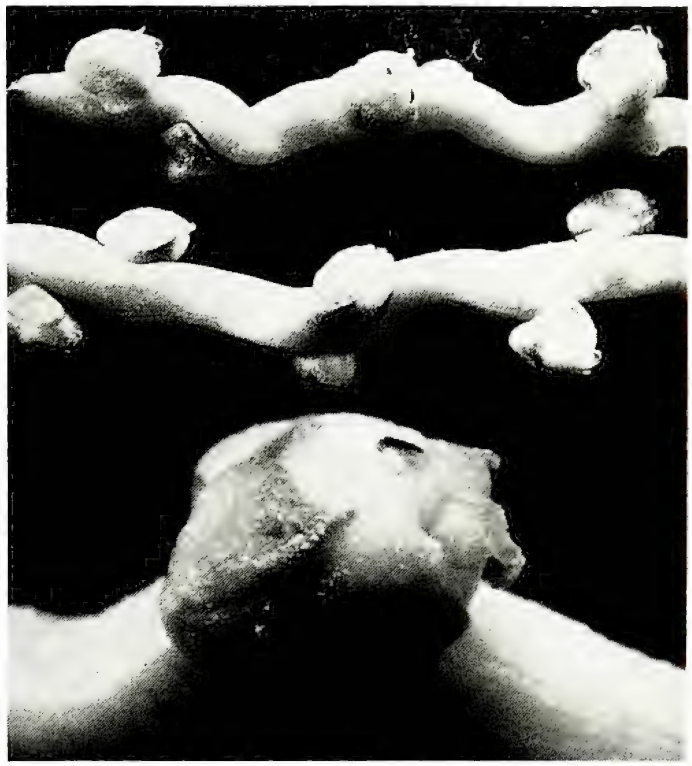


The stamens consist of very long anthers and short filaments. (I have not observed a reduced ovary.) The staminate flowers differ from those of the coconut-palm which show three small, pointed, sterile carpels. The anthers split long-side, releasing pale yellow, dry pollen which resembles wheat grain when seen under the microscope. The coconut-palm pollen is similar.

The anthesis (the flowering time when pollination takes place) of the male coconut flowers appears somewhat different from that of the male date flowers. In both the perianth does not completely unfold; but in the coconut flower, three stamens—probably from the sepal circle—appear between the petals, spread out.

The staminate flowers of the coconut-palm are revisited by insects which collect pollen. I am not quite sure whether I saw insects on the pistillate flowers. Dr. Otto Degener in *Plants of the Hawaiian National Park,* 1945, says that the

Top. Close-up of male flowers of the date-palm. Center. Longitudinal cut of male flowers, enlarged. Bottom. Transversal cut of male flowers, enlarged. They contain six stamens.

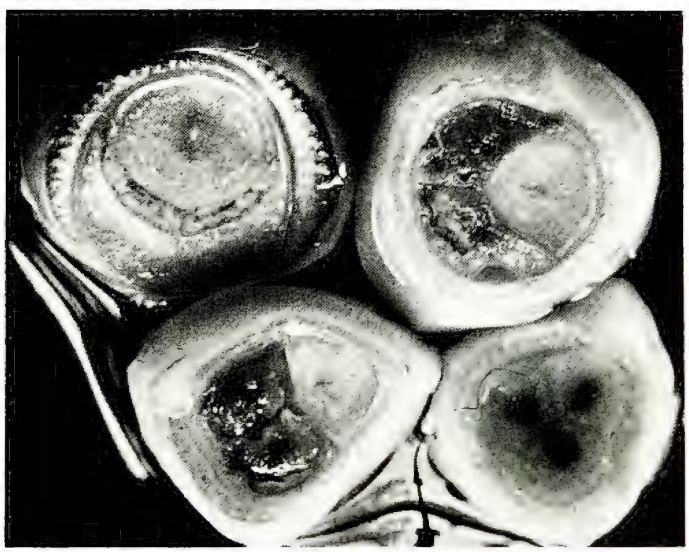


Top. Close-up of female flowers of the date-palm. Bottom. Female flower, enlarged, showing the uppermost parts of the three free carpels and the hook-shaped stigmas.

anthesis of the pistillate flowers begins after the staminate flowers have dropped off. A foreign pollination may be possible by insects. How it is with the date-palm, I do not know: I was not in Tucson or Indio at flowering time. One of the Indio growers writes, "Only the male flowers have fragrance, attracting bees," and I was told that bees do not visit the female flowers. It would seem as if there were no insect pollination.

The pistillate flowers of the date-palm are also trimerous. They are white when they appear, as are the staminate. It is not known when they are initiated. (It is also not known

Transversal cuts through female flowers in different stages, showing how the surviving carpel increases in size and the other two diminish and disappear. In the flower, lower right, the three carpels are about the same size in the earliest stage. Upper row left, the surviving carpel almost fills the entire interior of the flower; it would have become a fruit.



if and how the date-palm reacts to photoperiodism. Certain it is that the growing point is in complete darkness, and the tissue is without chlorophyll.)

The perianth of the female date flower differs somewhat from that of the male flower. The sepals are also leathery and short, but the petals are thin and slightly transparent. During the ripening of the fruit, the perianth dries and remains on the fruit. The gynoecium (the organ in which female cells are formed) consists of three free, fleshy carpels, while the gynoecium of the cocos flower has three carpels partly fused. When the anthesis of the female date flower begins, the carpels push through the corolla, and their uppermost parts with their hook-shaped stigmas become visible. The stigmas are covered with swollen, juicy-looking hairs, but the stigmas dry rather quickly and so the time for pollination is limited. Transversal cuts of the flowers in this stage show the three carpels with the ovules. The carpels are of the same size, yet one ovule appears different from the ovules in the two other carpels; this is the surviving ovule. The other ovules disintegrate very early, and the carpels in which they are enclosed, die off. Probably this disintegration is based on genetic circumstances, because the food supply for all three carpels is the same.

Here is an important difference between the date-palm and the coconut-palm: the date is a berry, the coconut a drupe. The shell of the latter shows scars which indicate that the coco "nut" originates from three carpels. The young, unopened, female coconut flower possesses partly tough, partly fleshy leaf organs—bracts, sepals, and petals—which soon make it difficult to cut or dissect the young hard and tough fruit. Before anthesis begins, it is possible to observe the very young fruit, one centimeter in diameter, almost the size of a cherry stone. It is white. Looking at it from above, one will notice that it consists of three carpels. These carpels are fleshy, as in the date flower, but they are partially fused; only in the center of the gynoecium are they free. Only one carpel contains an ovule from which a seedling develops; in its place in the other two carpels are a few large cells.

I have unanswered questions about the development of the coconut. How do the two ovule-less, sterile carpels participate in the development of the coconut? Is this a partial parthenocarpy? Do they get their food supply with the fertile carpel? The flesh, the endosperm, solid and liquid, belongs to the seed and therefore originates from the surviving ovule!

Dr. R. A. Whitehead, of the Coconut Industry Board, Kingston, Jamaica, West Indies, of whom I asked these questions, in December, 1962, replied, "It is likely that most of your questions are not going to be answered fully without a considerable amount of further research."

I have also observed that in further growth the stone, endocarp, is retarded and that the mesocarp, the later "coir," is advanced. In the tissue of the carpels, in the above described stage, no differentiation in exocarp, mesocarp, or endorcarp can be seen. That the three carpels are free in the center of the gynoecium may contribute to the fact that the "nut" is hollow. Because the young fruit is hard, it is difficult to investigate. I have seen the development of the seedling with the big spongy haustorium.

But to return to the date-palm. In April the female flowers are slightly green. Transversal cuts at different stages show how the surviving, the normal ovule-containing carpel increases in size and finally fills the entire space in the flower, to become a fleshy, sweet fruit. This is the answer to my question how the date, which we eat, develops.

The date has certain peculiarities. I speak now of the young green, unripened fruits that I received in April, 1962, from Indio. Below the epidermis is a layer of large, elongated, thick-walled stone cells which at maturity (in Indio called "bread dates") form a brown skin. This separates partly from the sweet flesh. Below the stone cells is a row of large cells which contribute to the partial separation of the skin when the fruit shrinks.

The seed, the date stone, is very hard in mature fruit, because of the deposition of hemicellulose in the thick cell walls of the endosperm. It was not possible for me to study the seed in its earliest stages. When I first examined the seed, it was a liquid-containing structure with a brown skin in the center of the carpel. Transversal and longitudinal sections, made by hand, did not reveal very much. Cross sections of later stages, when the seed was still soft, revealed the presence of a milky-looking endosperm with thick cell walls in which the hemicellulose is deposited. They showed a winged, brown-colored embryo with cell walls connected with the endosperm, the embryo attached by a short stalk, the chalaza, to the interior of the fruit wall. My observation differs from Baillon's illustration in *Histoire des Plantes.*

Wilhelm Troll in *Allgemeine Botanik,* 1959, mentions a haustorium. I believe his illustration originates from a mature seed.

Without any doubt, the wings absorb the food stored in the endosperm. The embryo with a very short stalk resembles an umbrella turned over by the wind and pressed from two sides. This is quite different from the embryo of the coconut, which first forms an undeveloped plug-like structure, producing a spongy haustorium which penetrates into the hole of the coconut and absorbs the solid and liquid food, stored in the endosperm, when it starts to develop roots.

I am indebted to Dr. Täckholm for her interest, and also to UNESCO which gave me her name after I had listened to the radio broadcast, "And in the Tomb were found," arranged by UNESCO, on WFLN, Philadelphia, February 15, 1962.

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* According to V. Täckholm in *Flora of Egypt* (Bulletin of the Faculty, Science, Cairo, Vol. II. 1950) Theophrastus had already used the Greek word *Phoenix*. It may refer to Phoenicia, the land of the date-palm; it may also refer to phoenix, the sacred bird of the Egyptians and the symbol of the rising sun. The Assyrian name of the date-palm, *Musukkan,* "head of heaven," is of Sumeric-Accadian origin. The pure ancient Egyptian names point to a very ancient cultivation.

** The coconut-palm *(Cocos nucifera)* originated in the Indonesian islands and, dispersed by the seafarings of the Polynesians along the Pacific shores, was brought to the Hawaiian islands. According to E. D. Merrill, it entered the Atlantic shores from the Isthmus of Panama. In ancient times migrating peoples took their food plants with them. Another food plant dispersed in this manner was the banana, which also originated in southern Asia and the Polynesian islands. According to Otto Degener, they brought banana clones to Hawaii, but from there the banana did not proceed to the mainland. The mainland received the banana via West Africa by the Spaniards and Portugese.

TREASURES OF THE GARDEN'S HERBARIUM
RELIQUIAE HAENKEANAE

By RUPERT C. BARNEBY

Mr. Barneby is Honorary Curator of Western American Botany at The New York Botanical Garden.

TO THE BOTANICAL HISTORIAN Thaddaeus Haenke is perhaps best known as editor of an edition of Linnaeus' *Genera Plantarum*[1] which appeared in Vienna in 1791. To the European botanist, however, his name is more likely to bring to mind an alpine pasture in the high mountains of central Europe. As a young man Haenke botanized over parts of Bohemia, Styria, Carinthia, the Tyrol, and Hungary, and he was either the first to find or at least the first to apply a permanent name[2] to such well-known plants as *Gentiana frigida* and *Dianthus glacialis*. Another little annual gentian which Haenke discovered in the Salzburg alps and christened *G. prostrata,* has since been found to range interruptedly around the Northern Hemisphere and south into the Andes; its small, ten-pointed stars of cold blue can be seen as far south in the Colorado Rocky Mountains as the Gunnison Valley, carrying the fame of its godparent far into the New World. In reality, however, Haenke's claim to fame in America is based on a more secure foundation. His contribution to European botany was modest, and he is remembered more vividly as one of the two botanists who accompanied the Malaspina Expedition into Pacific waters during the years 1789-1793. In California Haenke is honored as the first botanist to collect the redwood[3], of which he obtained cones at Monterey, cones thought to have given rise to a tree still growing in the Generalife Gardens at Granada. The redwood was not actually named from Haenke's specimens, but the stately valley oak *(Quercus lobata)* and the coast live oak *(Q. agrifolia)* were described by Luis Née, Haenke's companion on the Malaspina Expedition, from material gathered at the same time as the redwood, and form a noble memento of Haenke's visit to California in the fall of 1791.

Thaddaeus Peregrinus Xaverius Haenke was born December 5, 1761, at Kreibitz, a village in the Elbe Valley in what was then the Kingdom of Bohemia, later the Sudetenland, now part of the Czechoslovak People's Republic. He studied medicine, mathematics, and botany at the University of Prague, the latter under Mikan[4], receiving his doctorate of philosophy in 1782. He moved subsequently to Vienna where he enjoyed the friendship of the celebrated Nicholas von Jacquin and attracted the notice of Emperor Josef II, who recommended him as botanist to accompany the expedition of scientific discovery that the Spanish crown was planning to send to their colonies in the Pacific. The story of the elaborately equipped, brilliantly successful, but in the end tragically mismanaged and therefore in some respects abortive Malaspina Expedition has been told often[5], and cannot be repeated here. Very briefly we might recall that the corvettes *Descubierta* and *Atrevida,* under command of Allessandro Malaspina, sailed from Cadiz on July 30, 1789. Haenke had sped across Europe to join the expedition, but was delayed in Madrid and reached Cadiz a few hours too late to go aboard. He followed on the next boat sailing for

Phoebe cinnamomifolia (H.B.K.) Nées, collected by Thaddaeus Haenke in Peru in 1790. The label, lower right, is characteristic of the set of specimens received from Prague in 1933. The annotation label is by Dr. Caroline K. Allen, Research Associate of The New York Botanical Garden, the authority on New World Lauraceae.

South America, suffered shipwreck in the Plate estuary, and escaped, according to tradition, with only his copy of *Species Plantarum* and some collecting equipment. From Buenos Aires he proceeded overland across the pampas and the Andes, collecting as he went, and by extraordinary luck encountered Malaspina at Valparaiso in the spring of 1790. From then onwards Haenke accompanied Malaspina until the expedition returned to Valparaiso from the Philippines in 1793, when news of the French Revolution and the outbreak of war between Spain and France put an end to the venture.

In the intervening years Haenke collected in Chile, Peru, Ecuador, Panama, Mexico (making a trip on foot from Acapulco to Mexico City in the summer of 1791), California (in the fall of the same year), Vancouver Island, Sitka, and subsequently Guam and the Philippines. He is said to have amassed a collection of excellent quality and, at the time, of extraordinary interest and novelty. If Haenke's plants had fallen into the hands of Sir Joseph Banks in England, or of the great botanists working in France at the turn of the nineteenth century, they would undoubtedly have become the basis for descriptive works of capital importance. As happened to all the records of the Malaspina Expedition, the botanical booty of Haenke and Née was essentially wasted. The journal of the Expedition was pigeonholed in Madrid, and even today has not been fully published. Only a fraction of the plants brought back by Née and deposited at the Royal Garden in Madrid was ever critically studied. Haenke's collection lay for years in a warehouse in Cadiz; when the cases of specimens finally reached Prague, the contents were in disorder and partly damaged by mildew and insects. The importance of Haenke's bequest to posterity—if one can so translate the term *Reliquiae*—was first recognized by Count Caspar von Sternberg, the founder of the Royal Bohemian Museum, who made the plants available to the Czech botanists J. S. and K. B. Presl[6]. Their illustrated account entitled *Reliquiae Haenkeanae* began to appear in 1825 and continued until 1835; but due to financial difficulties the series was never completed, and only a small proportion of the four thousand species (or what remained of them after loan and damage) was carefully examined. In fact, the bulk of the collection lay unidentified at Prague for another century. In 1933 about twenty-four hundred of Haenke's *Reliquiae,* which had not been named by the Presls or others, were sent for identification to The New York Botanical Garden[7], with the understanding that unicates would be returned, but duplicates retained in the Garden's Herbarium. It is by this means that we possess today an estimated twelve-hundred sheets of Haenke's plants collected in North and South America and in the Pacific islands. Except for a small number of specimens, apparently mostly duplicates of grasses which had been studied by J. S. Presl, and were acquired by George Engelman in the Bernhardi Herbarium[8], now at the Missouri Botanical Garden in St. Louis, these are the only specimens of Haenke's known to have returned to the New World. The chief repository of the *Reliquiae Haenkeanae* is, of course, Prague (an estimated nine thousand sheets), but some are known to be at the Bavarian State Collection in Munich, at the Natural History Museum in Vienna, and a few each in the Delessert Herbarium at Geneva and the Rijksherbarium at Leyden.

Thaddaeus Haenke, 1761-1817.
From a photograph in *Botanisches Centralblatt*—Beihefte, 1940.

The value of the Haenke material in our Herbarium is difficult to estimate. The plants are among the oldest we possess, and almost certainly the oldest substantial collection from the New World tropics to be found in any North American botanical institution. If the collection had received the attention that it deserved when it reached Europe in 1794, it would be rich in isotypes. But this was not the case, and the majority of the specimens, which lack data of locality, or are sometimes wrongly labeled, are scarcely more than curiosities, of sentimental rather than genuine scientific value. Like Sessé and Mociño, the botanists of the grandiosely planned botanical exploration of Nueva España who were in Mexico shortly after he was, Haenke fell victim to the circumstances of his age, and in particular to the bureaucratic sloth and jealous obscurantism of the Spanish authorities. The Malaspina Expedition was planned by the relatively enlightened Carlos III, who died in 1788. His successor Carlos IV, whose terribly simple countenance like that of his avaricious Queen lives in the Goya portraits, had no interest in the sciences, and at the time Malaspina returned from South America, Carlos had surrendered the royal power to Godoy. Malaspina himself died in exile after eight years in a Spanish dungeon[9]. Haenke, perhaps wisely, never returned home but settled in Cochabamba, Bolivia, where he died in 1817. His last years were peaceful and busy. He practiced medicine, studied the languages and civilizations of the Andean Indians, established a botanical garden, and collected on the plateau and on the Amazonian slope. At his death, believed to have been caused by an accidental dose of poison, his collections and papers were transferred to Lima where they passed out of sight. He sent nothing to Europe after 1795, and nothing concrete of his declining years has survived. Several genera *Haenkea* have been proposed, but none of these is now in good repute. Perhaps after all the little *Gentiana prostrata* may be Haenke's closest link to immortality[10]

[1] Supposedly the eighth edition, but it appeared two years later than

(Continued on page 142)

CONVERSATIONS ON ECOLOGY IV

Dr. Luna B. Leopold is Chief Hydraulic Engineer for the Geological Survey of the United States. He has carried on research in meteorology, climatology, hydrology, and related sciences. He is one of the several brilliant children of Aldo Leopold, one of the founders of scientific conservation on this continent. Luna Leopold's direct contributions to resource management are numerous. His book (in collaboration with Thomas Maddock, Jr.) *The Flood Control Controversy* (The Ronald Press, New York, 1954) is considered a classic. This letter to Pierre Dansereau, who initiated the "conversations" in our January—February issue, sounds a new note on this year's topic, "Vegetation Management."

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Washington 25, D. C.

April 26, 1963

Dr. Pierre Dansereau
The New York Botanical Garden

Dear Pierre:

The conversations on ecology have mentioned the pesticide problem, and in such discussion it is easy to lose sight of the basic philosophic view which is an undercurrent in Miss Carson's book. I should like to expand on that philosophic premise and examine some of its implications for planning vegetation management measures as well as other measures for resource development.

Crowning a rounded hill and floating on the ground swell of New England in full fall color is a slim white shaft, pointing upward. The church spire symbolizes the raising of eyes aloft. It therefore reminds us of something higher than the mundane turmoil of the commonplace.

The little white church stands alone on its hill, flanked by native oaks and facing a little grassy sward. Whereas the spire points upward toward things of higher order, the village green also is a symbol—a symbol of elbow room. And if a weary businessman feels pressed or smothered by the day-to-day cares of the economic world, he can lift his eyes and see that there is still about him room to breathe and to let a weary soul expand.

So also in the Spanish-speaking communities of the Southwest, the long line of hitching posts before the mercantile houses seems to keep the economic turmoil from completely filling the room held open by the plaza, whose cottonwoods reach toward the blue sky. But how many of these plazas still remain? In La Junta, Colorado, for example, the cottonwoods are gone and no strip of grass remains. The windowless face of an air-conditioned office building looks from its four stark sides over the little storefronts where once the cowboys lounged. In Santa Fe, New Mexico, the old Federal Building, centered in a green oval of grass, has given up many of its cottonwoods and half of its open space to a new Post Office. Something has been lost. The balance sheet of economics undoubtedly showed that such a valuable piece of property in the center of town could not indefinitely be maintained as a wooded open space. But what appears to be a credit in the balance sheets at the town hall is a loss splashed in red ink before the eye of any discerning man.

To whom was the plaza in the southwestern village a thing of value? What was the nature of this value? One would suppose that if the majority of citizens had thought it a necessary part of their lives, it would not have gone under before the bulldozer of progress. Yet conversation with nearly any citizen indicates that he regrets the decision to give up the plaza for a new and ugly town hall.

Esthetic values are often lost, not because it is the will of the majority to give them up, but because the issue placed before the public is not in such form that their wishes on such a matter are directly expressed. The wheels of administration have usually turned too far toward a particular decision before the real desire of the people becomes known. Even the elected representative is usually faced with a decision to build or not to build. Very seldom is even he asked the question, "Is this something you want to give up?"

With this background we can begin to visualize one aspect of planning which has been, if not overlooked, at least given short shrift. Planning commissions, we are usually told, are bodies whose task it is to determine the best use of available resources. The duties of the planning commission are usually discussed in far greater detail than the definition of "best use."

Restricting ourselves now to resources, we may ask what we mean by "use." In practical terms a list of possible uses for a resource includes only those whose results can be evaluated in monetary terms. The idea of non-use is usually, therefore, excluded. Failure to use a resource can be considered foregoing a monetary gain and therefore would be debited as a monetary loss. By the same token, existence of scenery is not thought of as a use of landscape. On the other hand, maintenance of a scenic site for the purpose of herding the public in and out at two bits a head would be a very profitable use, and the usefulness of the scenic spot would then be measured by the ticket sales.

Then it is necessary to define what we mean by "best use." It immediately becomes obvious that we must ask—best use for whom, and in what way is it best even for them? Again, "best use" means the highest monetary return.

If one thinks this is far-fetched, he need only inspect the administration of national parks or the development of flood-control plans to take two somewhat dissimilar examples. A growing proportion of an increasing population, we are told, wishes to see the national parks. The success of the parks is demonstrated by the great increase in the number of visitors. That the quality of the experience of each visit has been materially reduced by the competition of mass use appears to have been all but overlooked.

Flood control offers another type of example. The construction agencies of the Federal Government, by the Flood Control Act of 1936, are authorized to provide flood protection for any area in which it can be demonstrated that the benefits exceed the costs. What benefits and what costs? Clearly, it is very difficult to assess the indirect and the nonmonetary benefits and costs. Therefore, simple and straightforward schemes are used by which the direct cost is mea-

sured by the engineering and associated works, and the benefits are computed in terms of direct flood losses which were prevented by these measures. If a few serene and historic valleys are flooded, the losses are at best recounted in a paragraph in a report, but they have no real effect on the decision to build. If some persons are displaced from the land their grandfathers tilled, the costs are listed only in terms of the money necessary to buy them out or to place them on new farms. That there was some cost to their souls is not a matter of economic concern.

With these examples we may then consider another aspect, or perhaps a different purpose for planning commissions. A planning unit might best assume the job of identifying values which, to be maintained, must be protected from the effects of ordinary expansion of use and development. We need not fear that the insatiable hunger of the Machine Age will fail to develop resources when the economic setting makes such development profitable.

If planning were to be viewed as the protection of the quality of the landscape, rather than as a publicly supported chamber of commerce to speed development, then it would be necessary to begin asking ourselves the question, "What kind of land do we want to live in?" This is the experiment which I suggest is in need of trial. What are the limits of development beyond which the people themselves would not care to go regardless of some slight increment of monetary gain? What in their community life do they want to protect and maintain? What aspects of the quality of living have that particular measure of esthetic value which a given community would not care to trade for economic expansion? Such questions could be asked of town councils, of civic groups, of business associations.

Presumably in considering the answers to these questions, most citizens would hope, and for good reason, for a reasonable expansion. But hopefully they would draw a limit when a slight increment in the income so derived would jeopardize certain aspects of their surroundings which they consider essential to their souls rather than to their pocketbooks. Interestingly, these kinds of questions have, to my knowledge, not been specifically directed to those groups of citizens and administrative bodies most concerned.

The answers might be expected to be tentative at any particular point in time. It would be only reasonable to expect that it would be necessary to assess the cost of what is singled out for preservation. But it is quite a different thing to assess the cost of a foregone gain than to weigh the value of the non-monetary object with others whose monetary value is clear and definable.

Next weekend you may decide to go skiing. It is only proper to ask yourself how much that weekend is going to cost you. It would, however, be fruitless to inquire in this connection what is the most economical way to spend your weekend. If you did so, obviously you never would ski.

It seems necessary, then, to visualize a new type of resource planning, based not on an extreme view of conserving and saving everything, but on a new kind of economics in which the monetary costs of saving something worth having would be realistically appraised after the decision to save it has already been made.

Continued preservation of landscape quality must sooner or later require that people begin to ask themselves what kind of place they want to live in and what it is worth to them to have it.

Sincerely,
Luna B. Leopold

(Continued from page 140)

the eighth edition of Schreber.

[2] Haenke's "Observations Botanicae in Bohemia, Austria, . . ." were published by N. Jacquin in *Collectanea,* **2**: 3-96. 1788.

[3] *Sequoia sempervirens.* See Jepson in *Madrono* **1**: 242. 1929.

[4] Josef Gottfried Mikan, 1743-1814, Professor of Botany at Prague University, is commemorated in the Composite genus *Mikania* Willd. The vinelike *M. scandens* is widely planted in Mediterranean and subtropical gardens as an ornamental wall-cover.

[5] Botanical aspects of the Malaspina Expedition are recorded by MacKelvey, *Exploration of the Trans-Mississippi West,* pp. 15-25. 1955; Alston in *Journal of Botany* **72**: 223-5; Stearn in *Journal of the Society of Bibliography of Natural History* **1**: 153-4. Each of these quotes the basic sources for a general history of the Expedition.

[6] Jan Swatopluk Presl (1791-1849) and Karel Boriwog Presl (1794-1852). Their middle names, which strike the Anglo-saxon eye as positively heathen, are piously Christian to the Czech. Prince Boriwog (or Borivoj) was the first Bohemian convert (ca. A. D. 873) to Christianity; Swatopluk = Heavenly Host.

[7] *Journal of The New York Botanical Garden* **34**: 184. 1933.

[8] The herbarium of J. J. Bernhardi (1774-1850) of Erfurt. An illustrated account of the Haenke grasses in this collection, which had been named by J. S. Presl, was given by Lamson-Scribner in the *Annual Report of the Missouri Botanical Garden.* **10**: 35-39, 54 Pl. 1899.

[9] But he lives on in Alaska's Malaspina Glacier, etc.

[10] The basic source for Haenke's biographer is Sternberg's account in the Preface to K. B. Presl's *Reliquiae Haenkeanae.* I have also drawn on the essay of J. Glickhorn in *Botanischen Centralblatt,* Beih. **60A**: 157-222, Pl. 5+ fig. 1. 1950.

The world is too much with us: late and soon,
Getting and spending, we lay waste our powers;
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!
This sea that bares her bosom to the moon;
The winds that will be howling at all hours,
And are up-gathered now like sleeping flowers;
For this, for everything, we are out of time;
It moves us not.

WILLIAM WORDSWORTH (1770-1850)

MANUAL OF VASCULAR PLANTS OF NORTHEASTERN UNITED STATES AND ADJACENT CANADA

A REVIEW

By STANWYN G. SHETLER

Smithsonian Institution, Washington, D. C.

FOR SIXTY-FIVE YEARS students of the northeastern flora have enjoyed the luxury of two comprehensive and generally excellent floristic treatises, which in their current revisions are still very much up-to-date—*Gray's Manual of Botany,* Eighth Edition (Fernald, 1950) and the *New Britton and Brown Illustrated Flora* (Gleason, 1952). For obvious reasons they have always complemented more than competed with each other, despite nearly synonymous coverage. Now once again we shall have a second *manual!* (Britton tried the manual experiment before with only brief success.) The new manual universally evokes, "Why do we need this book?".

The Gleason-Cronquist Manual is fundamentally Gleason's Flora without the illustrations, and it includes handy cross references to the Flora under each family and genus. We are told that this manual brings to fruition a long-held intention of Gleason, but Cronquist must be credited with the present endeavor. The latter's modest prefatorial claims notwithstanding, the changes are substantial in total, although the majority are minor and editorial or organizational in nature. The book is very well bound and surprisingly compact (smaller than Gray's Manual)—truly a field manual. One applauds the decision to stay away from "Bible paper." Despite the momentary start one gets from keys in six-point type and from unorthodox abbreviations (e.g. "pet" for petals"), which tend to shock one's sense of linguistic propriety, the format is pleasing, and the keys and descriptions are quite easy to read. Perhaps the economy should have extended to the rather garish and unnecessarily large headings in the family keys at the front.

Most striking throughout is the thorough streamlining Cronquist has given the original text. From the more obvious omissions of the long "Introduction" and "List of Botanical Authors" (fortunately the glossary was retained) to the innumerable tighter rephrasings of the keys, descriptions, and geographic ranges, relentless pruning and condensation are everywhere apparent. On the whole he has succeeded admirably well at achieving greater clarity and simplicity through greater brevity without compromising vital detail—apparently a primary goal. This in itself represents an enormous and tedious effort.

The decision to restrict the geographic scope by excluding the Gaspé region and that part of Missouri south of the Missouri River and to omit many waifs and highly localized alien species from the keys, while simplifying the keys and making the manual less formidable for the average user and perhaps therefore fully justified, are nonetheless somewhat disturbing in principle. The effective range of any manual is always a bit larger than the stated range, and what appear now to be minor exclusions may in practice prove to be rather more significant, especially for those beyond the stated periphery. Nor is one always happy with the attempts to abridge the geographic ranges of the individual species—for example, when he finds that the two varieties of *Scirpus smithii* are said to have a "nearly coextensive range," although Gleason, in fact, gave a decidedly more southern range for one than the other. These instances leave one wondering whether the abridged version reflects new information or ill-advised pruning.

Particularly disappointing to taxonomists will be the omission from many keys of certain more discriminating characters (e.g., strobilus characters, *Equisetum*), which despite their technicality may at times be indispensable, and the frequent omission or condensation to near-emasculation of Gleason's numerous critical taxonomic notes. To render "closely related to the Old World *S. supinus* L." as "*S. supinus* misapplied," for example, is hardly accurate (cf. under *Scirpus hallii*). On the other hand, few are likely to regret the omission of orders with their respective family keys. And welcome are Cronquist's own comments, added frequently; although, while realizing the customary practice of omitting citations in manuals, we wish in places for documentation. We are told, albeit obliquely, that Wagner's views have influenced the treatment of ferns (cf. footnote, p. 9), but we can only guess the authorities for the comments under *Cystopteris fragilis,* the list of *Crataegus* hybrids, or the generously lumped treatment of *Epilobium.*

The keys were vigorously pruned throughout, and many were repermuted to a greater or lesser extent, so as to insure clarity and parallel construction. Some were rather completely reorganized (e.g., *Salix, Rosaceae*). The editorial plan was not everywhere uniform, however. Where Gleason had two keys for difficult genera or families (e.g., *Ranunculus, Fabaceae*), Cronquist generally has one, but not always (e.g., *Populus*). Usually one of Gleason's keys was retained more or less intact, the other simply being dropped, but sometimes two were to a degree integrated into one (e.g., *Ericaceae*). To be sure, the retained key or composite is calculated for the average situation, but one regrets losing nearly all Gleason's useful, sometimes crucial contingency keys, as his "Artificial Key" to the *Fabaceae.*

With seeming capriciousness, Cronquist has partitioned certain of Gleason's longer keys at arbitrary points (e.g., *Juncus, Cruciferae*) into convenient groups of taxa and provided us with a preliminary key, consisting of the appropriate lines extracted from the original key, to these groups; while at the same time he reintegrates other keys originally grouped by Gleason (e.g., *Cyperus*). Perhaps these newly grouped keys are a bit easier to use, but taxonomically they are misleading. "Group" in this context suggests affinity, and one winces to find the new groupings wholly artificial (e.g., *Panicum*). A solution similar to that effected by Gleason in the *Umbelliferae* (also adopted by Cronquist) might have been less misleading and equally functional. Sometimes subfamilies or tribes were retained (e.g., *Rosaceae),* sometimes dropped (e.g., *Caryophyllaceae. Fabaceae).* Occasionally the surgery was brutal, as where "submersed, floating, or rarely emersed aquatic with flaccid culms" became simply "flaccid perennial" (cf. *Scirpus* key). For the greater part, the style of the keys has been much improved

(Continued on page 161)

MANUAL OF VASCULAR PLANTS OF NORTHEASTERN UNITED STATES AND ADJACENT CANADA. Gleason, Henry A., & Arthur Cronquist. 810 pages, indexed. D. Van Nostrand Company, Inc., Princeton, N. J. 1963. $11.75.

THE GOURD THROUGHOUT THE AGES

By EDDIE W. WILSON

Mrs. Wilson, an authority on gourds and folklore, is author of *The Gourd in Folk Literature,* No. 3 in the Ethnographical Series published by the Gourd Society of America, Inc., and an associate editor of *Gourd Seed,* the Society's bulletin.

ETHNOLOGIST AND ARCHAEOLOGIST have placed the beginning of the gourd* in the Mesolithic Age which existed about ten thousand years ago. At that time man was leaving his cave or rock shelter and was building either a hut or a lake-dwelling.

While the gourd flourished in a wild state, its seed (or the gourd itself) was carried from place to place by man whether he was potter, metal worker, artist, soldier, or pioneer housewife. The medicine man, magician, teller of tales, poet, musician, and student of symbolism held the gourd in high esteem. Moreover, it served man in various useful respects.

From tombs of ancient Egypt, dating from the Pre-Dynastic Period, 4,000-3,600 B.C., have come gourd-shaped ceramics. Gourd water-flasks (of the genus *Lagenaria*) have been found in tombs of the Twelfth Dynasty, 2,200 or 2,400 B.C. Gourd-shaped Chinese pottery dates from the Six Dynasties, 220-618 A.D. An example from this period is the squatting figure of a wine-bearer holding a large gourd in his arms. Throughout the Chinese Han Dynasty, 206 B.C.-220 A.D. to the end of the Ming Dynasty, 1,368-1,644 A.D., vases of gourd and double gourd shape abounded in China.

Clay vessels fashioned in the shape of gourds have been taken from Mysore graves in India, their age quite indefinite. The red-ware bowl from British Honduras, illustrated in these pages, is of uncertain date.

On various archaeological sites in the United States, gourds and gourd-shaped vessels have been found. The early American-Indian woman potter not only used the gourd as a form for her vessels, but she used a piece of gourd shell for smoothing the finished product before she fired it.

Ancient Aztec, Mayan, and Inca civilizations made gourd-shaped vessels from metals.

* A general name for members of the Gourd Family, *Cucurbitaceae,* including these genera: *Cucurbita,* yellow-flowered gourds; *Lagenaria,* white-flowered; *Benincasa,* wax gourds; *Luffa,* dishcloth gourds; and *Cucumis.*

The gourd design in Chinese art shows that this fruit was prominent in Chinese religion, philosophy, and ceremonials. Li T'ieh-Kuai, one of the "Eight Immortals," is always depicted with his crutch and gourd of magic medicines. Another Chinese healer of disease was Wei-ku, "King of Medicines." From his girdle hung several dozen gourds, containing remedies which he generously dispensed for the healing of vast numbers of people. As a sign of celibacy, the gourd is an attribute of many Chinese sages and immortals.

In Japan the legend is told of the immortal Chokwaro who wandered about the country on a magic horse of his own creation. Chokwaro kept this wonderful creature, when not in service, in a gourd he carried on a staff.

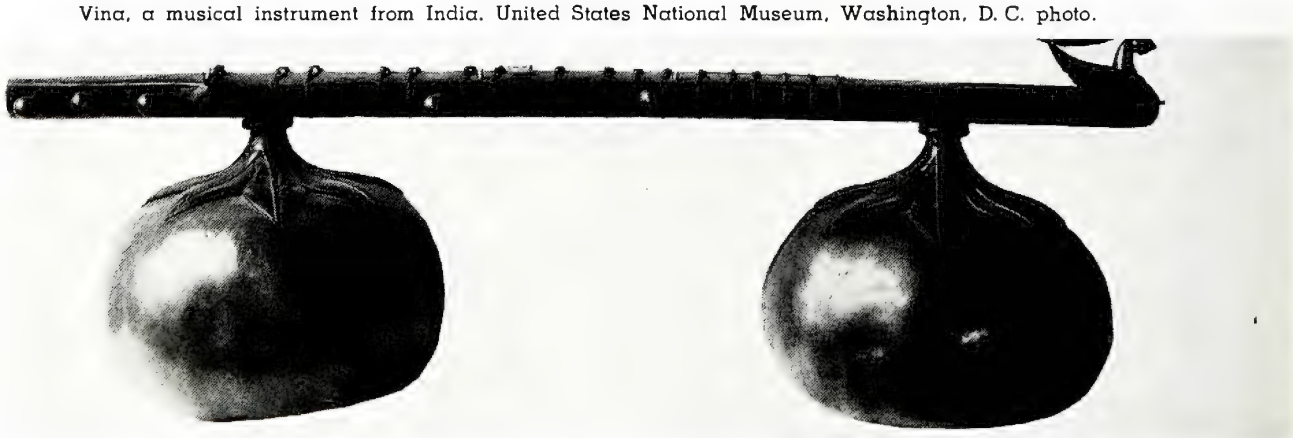
A red-ware bowl, with human figure holding a gourd rattle, taken from an ancient mound in the Corozal District of British Honduras. Bureau of American Ethnology, Washington, D.C. photo.

In both China and Japan the gourd is the symbol of longevity and health, since it cannot be submerged in water, "the flow and turmoil of life," but always "pops up again."

The Tewa medicine man ground the roots of the wild gourd into a fine powder, stirred this in cold water, then drank it as a laxative. The Pima pounded this root in a mortar, boiled it, and put the extracted juice into the ear to cure earache. Certain tribes steeped gourd leaves to a mash and applied them to swellings.

The medicine men or shamans of most of the tribes shook

Vina, a musical instrument from India. United States National Museum, Washington, D. C. photo.



their gourd rattles in rituals which were connected with success in the hunt, the growing of crops, and the curing of disease. The Comanche shaman was known to rattle his gourd all night long, as he prayed and chanted. The Pima priest sings, in "The Song of the Vision Maker,"

And I sit with my gourd rattle
Engaged in the sacred chant.

Gourds have been useful in warfare. According to legend, Hannibal, the Carthaginian general, 247-183 B.C., transported elephants across the Strait of Gibralter on rafts made buoyant by large gourds. Aeneas says that in the fourth century the Greeks imported arms "by stealth, sometimes concealing the unsheathed daggers in ripe gourds." The soldier in the War of the American Revolution carried his gourd powder horn.

In the history of the Quiché-Cakchiqual empire in Guatamala, it is said that gourds were filled with hornets and wasps, and that the insects were released against attacking enemies at a fitting moment. Then, when the enemies threw themselves on the ground in agony, the Quiché warriors slaughtered them.

Originally the banjo-body was the shell of a gourd, and many a square dance in the pioneer days of this country was accompanied by music from a gourd. Joel Walker Sweeney added a fifth string to this primitive musical instrument, and thus the modern banjo was evolved. The gourd is part of other musical instruments: the gourd trumpet of Brazil; the shêng of China; the hula-hula drums of Hawaii; and the gourd drums of southern India, Malabar, Arabia, and Mozambique, Africa. The marimba of Africa and Guatemala has gourd resonators, and the balalaika of Russia has a gourd body. The splendidly decorated vina of India with its gourd resonators is said to have been the gift of Sarasvati, Hindu goddess of music, wisdom, and science.

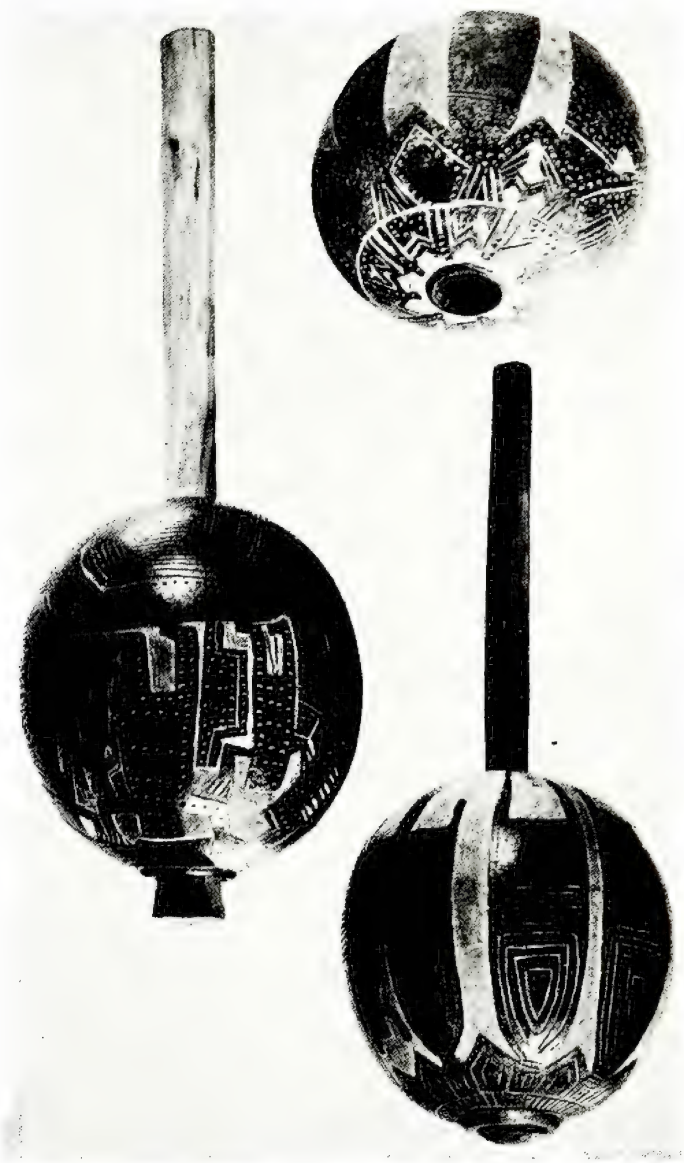
One of Audubon's most famous prints shows purple martins nesting in a gourd.

The pioneer housewife made good use of gourds. She made them into dippers and containers as kitchen utensils and other household articles. She used them for stuffing sausage, for darning. She gave the baby a dried gourd on which to cut his teeth and a gourd rattle with which to amuse himself. Mrs. J. S. Harris of Dearing, Georgia, made a gourd bassinet for all four of her children; this gourd, raised by her mother, was sixty inches in diameter.

The gourd has indeed served mankind in many ways.

A rose, as fair as ever saw the North,
Grew in a little garden all alone;
A sweeter flower did Nature ne'er put forth,
Nor fairer garden yet was never known;
The maidens danced about it morn and noon,
And learned bards of it their ditties made;
The nimble fairies by the pale-faced moon
Water'd the root and kiss'd her pretty shade.
But well—a day!—the gardener careless grew;
The maids and fairies both were kept away,
And in a drought the caterpillars threw
Themselves upon the bud and every spray.
God shield the stock! If heaven send no supplies,
The fairest blossom of the garden dies.

WILLIAM BROWNE (1588-1643)



Shaman's rattles. Yaruros of the Capanaparo River, Venezuela. Bureau of American Ethnology, Washington, D.C., photo.

Li T'ieh-Kuai with gourd and crutch.

BROMELIADS

By WALTER SINGER

Mr. Singer is Staff Photographer of The New York Botanical Garden. In previous issues of *The Garden Journal,* he has discussed the historical background and the culture of bromeliads, a group of plants with which he has had considerable experience. In the May-June issue and in this issue he presents a selection of bromeliads.

Fosterella penduliflora was originally known as *Lindmania penduliflora.* But the genus was renamed *Fosterella* in honor of Mulford B. Foster of Orlando, Florida, whose contributions to the *Bromeliaceae* are known all over the world. *F. penduliflora* is a terrestrial bromeliad from northwest Argentina. Its grayish green leaves have a lighter green center stripe, the edge of the leaf being smooth and wavy. The branched inflorescence bears small, white flowers. L-MT-FO.*

Guzmania, named in honor of the Spanish naturalist Guzman, includes some of the most colorful bromeliads which are suited for use as house plants. They are closely related to tillandsias and vrieseas, and their cultural requirements are very similar. Their geographical distribution ranges from Florida to the West Indies, Central America, and south to western Brazil; many of them were collected in Colombia. Guzmanias generally are epiphytic. Their inflorescences stand well above the leaf rosettes.

Guzmania berteroniana is native to Puerto Rico where, on top of El Yunque, it presents an unforgettable sight when in bloom, the large, glowing vermilion-red inflorescences appearing to be lighted candles. Carlo Bertero, in whose honor the genus is named, collected this bromeliad for the first time in 1818. One hundred and thirty years later, when I saw it on a visit to El Yunque, I could readily understand how delighted he had been at sight of this beautiful plant. The glossy, leathery, light green leaves form a dense rosette, usually firmly attached in the tree tops. The brilliant red-hot-poker-like inflorescence bears bright yellow flowers. SH-ME-FL.

Guzmania dissitiflora is a bromeliad of small to medium size and therefore well suited for pot-plant culture. The light green, rather narrow leaves are pencil-striped at the base and recurve gracefully. The red inflorescence bears yellow flowers. *G. dissitiflora* is native to Colombia. L-ME-FL.

Guzmania lingulata derives its name from the tongue-shaped, glossy, green leaves. There are several (possibly five) established, named varieties of this species which vary in size and color of leaves, bracts, and flowers. Nearly all develop an inflorescence which is a star-shaped rosette of bright-colored bracts. *G. lingulata* var. *lingulata* has brilliant red bracts and yellowish white flowers. *G. lingulata* var. *minor* is a smaller plant with glossy, green leaves which have reddish pencil-stripes at their base. The bracts are more orange than red. The flowers are white. *G. lingulata* var. *cardinalis* is larger than the other varieties, and the inflorescence is more brilliant. *G. lingulata* is native to Central America, Ecuador, and Colombia and was introduced in Europe in 1776. SH-MT-FL.

Guzmania monostachia, an epiphytic bromeliad from Central America, Brazil, and the West Indies, has glossy, light green leaves which form a dense, symmetrical rosette. On the lower portion of the flower-spike are oval, whitish green bracts with dark maroon or brown pencil-lines; on the upper portion the bracts are vividly scarlet-red. The flowers are white. L-MT-FL.

Guzmania musaica was named by Mez in 1896; it had been found in 1867 near Ocana, Colombia. This is one of the most showy of bromeliads because of its colorful foliage and its bright inflorescence. The green leaves are decorated with transverse bands made up of thin, irregular, dark green and brown lines. On the under side of the leaves, the wavy lines are more pronounced and darker, and the entire under surface is purplish-tinted. The flower-spike is covered with red-lined bracts; toward the flower-head, the bracts become bright orange-red. The flowers are creamy or golden-yellow, tipped white. *G. musaica* is somewhat difficult to grow and propagate, but is well worth every effort spent on its culture. There is a variety, *zebrina,* which has darker crossbands than the species. SH-ME-FL-FO.

Guzmania sanguinea (1876) has very colorful leaves which become intensely blood-red in the center of the rosette shortly before the plant blooms. Since it is of medium size and not too difficult to grow, this species from Colombia makes an excellent house plant. The flowers, small and off-color yellowish white, are nearly hidden in the center of the leaf-rosette. SH-ME-FO.

Guzmania vittata (1830). This medium-sized epiphytic bromeliad from Colombia has beautiful foliage (though rather narrow-leaved) decorated with crossbands similar in design and color to those of *G. musaica* and of *Vriesea hieroglyphica.* The inflorescence is not showy, the flowers being small and white. Most of the plants I have seen were collected from their native habitat; it will be interesting to observe the development of this species under cultivation. SH-ME-FO.

Guzmania zahnii. The beauty of this graceful bromeliad from Colombia and the Chirigin Mountains of Central America lies in the thin, slender, pencil-lined leaves. The lines are longitudinal, starting at the base with an intense reddish to maroon-brown color and blending into an olive-green which is nearly transparent at the leaf-tip. The center of the rosette has a slight rose to pink overtone. These light tinges of rose may become coppery red in ample diffused light. The inflorescence is equally colorful and often branched. The bracts are bright red, sometimes a little lighter, and the flowers yellow, tipping into white. L-ME-FL-FO.

Hechtia. This genus, mostly represented in Mexico, was named in honor of Regierungsrat (Councilor) Julius H. Hecht of Potsdam, Germany. For many years hechtias were included in succulent collections, and then only as small- or medium-sized plants; but when bromeliads began to be used in landscaping in southern parts of the country, larger specimens of hechtias were planted outdoors.

Hechtia argentea and *H. glomerata* are old-time favorites. Both have ornamental leaves with large, recurved, sharp saw-teeth. Their symmetrical rosettes make attractive show plants. DL-MS-FO.

Hohenbergia stellata has the appearance of an aechmea except for its showy inflorescence on which alternate clusters of stars burst into bloom. The bracts are red, and the flowers blue to purple. *H. stellata* comes from Brazil and Venezuela. DL-MT-FL.

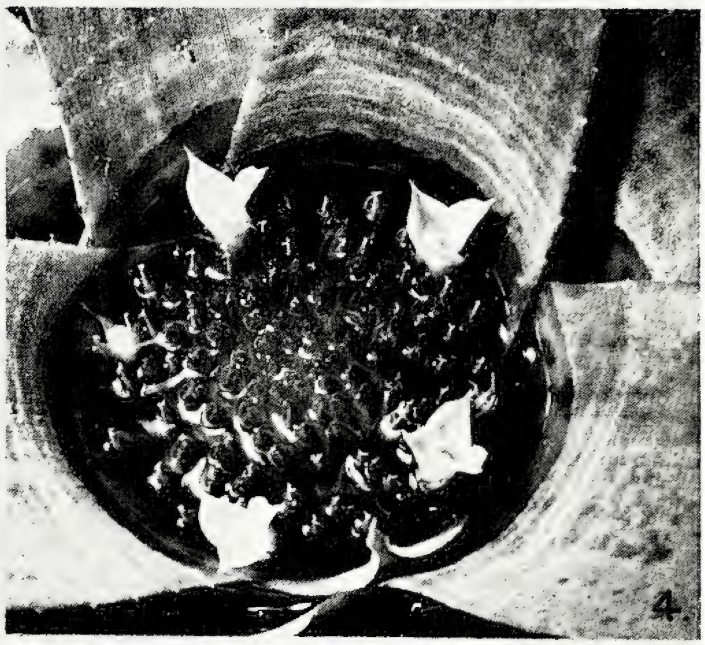
Navia nubicola, a saxicolous bromeliad, was collected on expeditions which Dr. Bassett Maguire conducted with his associates in rocky regions of the Amazonas territory. Dr. Maguire has made great contributions in the collection of *Navia* species and has brought back more than any other bromeliad collector. Several species of this genus are medium-sized plants, well suited for indoor culture: *N. nubicola* is one of them. Its long, narrow, pointed leaves, reddish at the base, form beautiful, symmetrical rosettes. The flowers are white. DL-MS-FO.

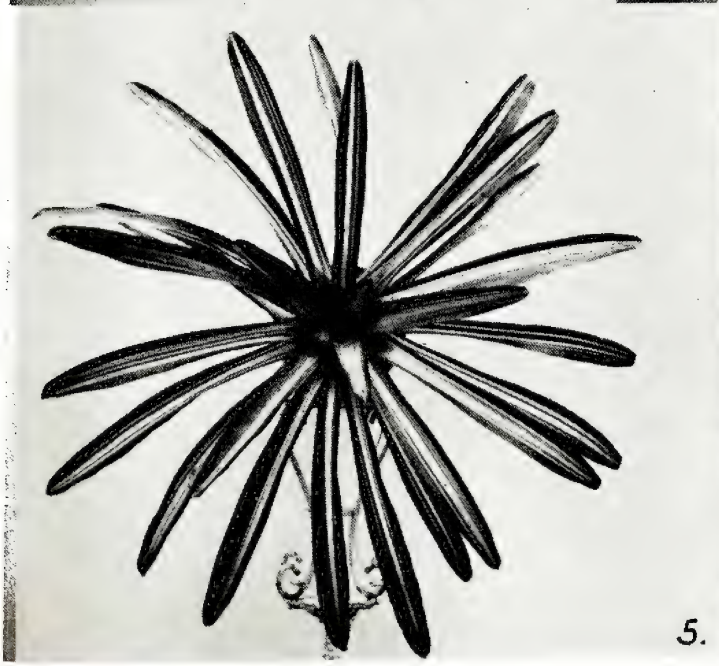
Neoglaziovia variegata is a tall, terrestrial bromeliad from Brazil, whose narrow, brown leaves are marked with silvery gray crossbands. Since the leaves furnish an excellent fiber for weaving, *N. variegata* is known more as a plant of economic value than as an ornamental. The inflorescence carries scarlet bracts and violet-purple flowers. The name *Neoglaziovia* was created in honor of A. Glazov, a French collector and landscape architect who was in charge of Rio de Janeiro's public gardens in the late nineteenth century. DL-MT-MS-FO.

Neoregelia is a genus of about thirty species, most of which are

1. *Guzmania berteroniana.*
2. *Guzmania musaica.*
3. *Navia nubicola.*
4. *Neoregelia spectabilis.*
5. *Neoregelia carolinae 'Tricolor'.*
6. *Nidularium innocentii* var. *innocentii.*

* For explanation of code, see "The Bromeliads," *The Garden Journal,* May-June, 1963, p. 104.





native to Brazil. There are epiphytic and terrestrial species; occasionally the same species may be both epiphytic and terrestrial. The genus was originally called *Aregelia,* after the botanist C. von Regel; later, Dr. Lyman B. Smith changed the name to *Neoregelia* to clarify any confusion with plants of an entirely different group. Several species and hybrids of *Neoregelia* have become extremely popular commerical house plants, especially varieties and forms of *N. carolinae, N. marmorata,* and *N. spectabilis* which produce their blushing red heart-cups before and around flowering time. Furthermore, neoregelias are easily propagated by offsets and seeds. Those who use these bromeliads in landscaping have noticed that they can withstand low temperatures, even light frosts. *Exotica* 3, the third edition of Alfred B. Graf's "Pictorial Cyclopedia of Exotic Plants," has illustrated twenty-five different neoregelias in the section devoted to bromeliads. All told, 592 members of the *Bromeliaceae* are included in this work.

Neoregelia carolinae from Brazil is the species of the genus with plain green, that is, unvariegated leaves. The glossy, leathery leaves, however, become a coppery red before the flowering period, and the inner leaves turn into a brilliant carmine-red. The pincushion inflorescence is so short-stemmed that it seems as if it were a nest within the leaf-cup. The flowers are lavender-violet, their margins oftimes fading into white. L-ME-FL.

Neoregelia carolinae 'Tricolor' is a variegated form which has longitudinal stripes on the long, glossy, dark green leaves. The entire foliage blushes (red tint) at flowering time, and the inner cup leaves are completely carmine-red. The flowers, sitting on a pincushion inflorescence, are lavender-violet with fainter edges. The beauty of the blushing heart of this bromeliad lasts from nine to twelve months. L-ME-FL.

Neoregelia marmorata is probably, in the original pure species, no longer found in cultivation. Because of its easy hybridization, most of the so-called marmoratas in cultivation are hybrids; and there are many with excellent coloration of the foliage. The leaves are stiff, leathery, light to yellowish green both on the upper and lower surface, and marbled with reddish and chocolate-brown blotches. At flowering the center (cup) of the dense leaf-rosette becomes carmine-red. The small flowers are a very pale lavender. L-MT-FO.

Neoregelia sarmentosa chlorosticta is a small, very colorful-leaved Brazilian bromeliad, with a rather erect rosette. The leaves are narrower than those of most neoregelias and very pointed. The red coloration of the leaves is so abundant that it appears as if the green were in blotches. The flowers are small and pale, a bluish lavender deep in the center. L-MT-FO.

Neoregelia spectabilis, another Brazilian species, best known as the "fingernail plant" because of its cerise-red-painted leaf-tips which, in lesser degree, is a characteristic of nearly all neoregelias. The handsome, dense rosette is formed of leathery, straplike leaves, grayish green above and silvery-banded beneath. The flowers are small and blue. L-MT-FO.

Neoregelia tristis is not as sad as its name. It is one of the small-sized species from Brazil, similar in growth to *N. sarmentosa chlorosticta* except for the color of its leaves which are grayish green with a dull, dark brownish red mottling in small blotches. The under surface of the leaves is scaly gray, with lighter gray crossbands. The flowers are light lavender. L-MT-FO.

Nidularium. This genus derived its name from the nest *(nidus)* or cup in which the flowers rest. Most of the species are epiphytes in the rainforests of Brazil, usually forming dense, low rosettes with strong, leathery leaves. Their flowers are white, blue, or reddish, dome-shaped, and nearly always closed---one of the reasons why they are difficult to pollinate and why seeds are not readily available. However, their blushing red cups last for a long time, and so nidulariums are attractive house plants.

Nidularium fulgens has yellowish green leaves dotted with dark green spots. The leaf-edges are serrated, with the green spines showing reddish points. At flowering time the cup of this Brazilian bromeliad becomes a bright cerise. The flowers are blue with a lighter, nearly white base. SH-ME-FL.

Nidularium innocentii var. *innocentii* is a veteran bromeliad (1870), also from Brazil. Its name has been changed many times; the name it now bears is in honor of the Marquis de St. Innocent of France. It is a large plant, with dark magenta to deep purple leaves and a very glossy under surface. The center cup is rusty red at flowering time, the white flowers nesting deep within. SH-ME-FL-FO.

Nidularium innocentii var. *lineatum* and *N. innocentii* var. *striatum* are varieties with lengthwise-stripes of yellowish cream-white. Variety *lineatum* has narrower and whiter variegation, while that of variety *striatum* is wider and a more cream-ivory. Both varieties, native to Brazil, have white flowers in a carmine-colored cup. SH-ME-FO-FL.

Nidularium innocentii var. *nana,* another Brazilian, has thin, matte green leaves with fine-toothed edges. The under side is glossy purple. At flowering time the center cup turns to a matte scarlet. The flowers are white. SH-ME-FLO.

Nidularium procerum. This relatively large bromeliad has strong, leathery, yellow-green leaves which assume a reddish tint in good light. Deep within the rusty to scarlet-red cup are the orange-red flowers. *N. procerum* comes from Brazil. SH-ME-FL.

Nidularium purpureum has thin, metallic purple leaves; these have a matte upper surface, a glossy, maroon under surface. The center nest (cup) becomes dull red at flowering time and bears the small, rosy red flowers. *N. purpureum* also comes from Brazil. SH-ME-FO-FL.

Ochagavia carnea (lindleyana) is a terrestrial or saxicolous, succulent bromeliad of medium size. The dark green leaves have spiny edges; the under surface is marked with grayish scaly lines. The ball-shaped head of the inflorescence is well filled with rose-colored bracts which are covered with a thick, white powder. The flowers are pink to lavender, their decorative value enhanced by the bright yellow stamens. The genus was named in honor of Sylvestris Ochagavia, Minister of Education in Chile, 1853-1854. DL-MT-FL.

Orthophytum maracasense is a species from Brazil which may also be enjoyed by fanciers of cacti and succulents as well as by bromeliad enthusiasts. Its leaves are scaly, coppery red, and recurved, with spiny edges. The short inflorescence bears lovely white flowers. The generic name comes from the Greek *ortho,* straight, and *phytum,* plant, in reference to the erect inflorescence. DS-MT-S-FO.

Pitcairnia. This genus, named in honor of Dr. William Pitcairn, London physician of the first half of the eighteenth century, numbers about one hundred and seventy terrestrial and saxicolous species. Next to the genus *Tillandsia,* it is the largest genus of the *Bromeliaceae.* Most of the species, native from Mexico to Ecuador, are large plants and have very showy and colorful inflorescences. They are desirable for sunny locations in southern gardens. Pitcairnias, because of their large size and the short life span of their flowers, are rarely used as house plants. *Pitcairnia corallina* is often seen in conservatories as a specimen basket plant or in combination with other plants in wire baskets or on rafters. The leaves are grayish green and very scaly beneath, and their strong petioles are armed with brown spines. The pendent inflorescence bears showy coral-red flowers. This Colombian species is "tough" to handle—but beautiful. DL-MT-FL.

Puya alpestris, a Chilean bromeliad for the succulent collection, has a beautiful branched inflorescence with dull blue flowers, from which the orange-colored pollen-bearing anthers stand out vividly. The gracefully recurved leaves are armed with sharp, spiny edges. DS-MS-FL.

Puya berteroniana and *P. chilensis,* both natives of Chile, may be enjoyed in southern gardens; they are too large for indoor culture. Both these species have tremendous flower-stalks with a multitude of flowers. The colors of the flowers of *P. berteroniana* are green and metallic blue, of *P. chilensis* green and yellow. DL-MT-FL.

Puya raimondii, a native of Peru, should be mentioned because of its giant size; it is possibly forty feet tall. While this bromeliad will hardly fit into a living-room or back-yard garden, it is interesting to know that bromeliads attain this great size. The inflorescence reaches up to fifteen or twenty feet and carries thousands of white flowers. After this spectacular show, the plant dies.

Puya spathacea is a terrestrial bromeliad of medium size from Argentina. Its loose rosette consists of pointed, rather narrow leaves which have sharp spines, also feltlike, gray scales beneath. The much-branched inflorescence is rose-red and bears numerous flowers which are green at the base, going into a metallic blue to purple, tipped green. DL-MS-FL.

Quesnelia arvensis, which bears the name of the French botanist S.

7. *Orthophytum maracasense*
8. *Quesnelia arvensis*
9. *Tillandsia flexuosa*
10. *Vriesea splendens* 'Major'
11. *Vriesea hieroglyphica*
12. *Wittrockia superba*

7.

8.

9.

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12.

Quesnel, is a Brazilian bromeliad with a very stiff, beautifully symmetrical leaf-rosette. The leaves are prominently spined and well marked on the under side with distinct silver-gray crossbands. The inflorescence bears watermelon-pink bracts and white and blue flowers. L-MT-FL.
Quesnelia quesneliana. Its stiff, leathery, green leaves form a dense rosette. The inflorescence, resembling a pink torch, bears lavender-blue flowers with a white edge. *Q. quesneliana* comes from French Guiana. L-MT-FL.

Ronnbergia colombiana was named in honor of Monsieur Ronnberg, who was Director of Agriculture and Horticulture in Belgium at the beginning of the nineteenth century. This Colombian bromeliad has well-colored leaves, basically dark green marked with red blotches and a silver-gray scaling beneath. The purple flowers have white edges. It is an epiphytic bromeliad. L-ME-FL.

Tillandsia. This genus numbers the most species (more than four hundred) in the *Bromeliaceae* and has the widest distribution. Nearly all the tillandsias are epiphytes, growing on trees, telephone wires, and other supports. Rarely are they found growing on rocks; and even then, they may have epiphytic roots. The epiphytic root-system is usually wiry. The foliage varies greatly in color, shape, and texture; the leaves are often covered heavily with lepidote or tomentose scales. Many of the species have very showy and colorful flowers (some of them fragrant during the night); on the other hand, the flowers of some species are so small that they are hardly visible to the naked eye. The seeds are usually equipped with a plumose appendage, like a tiny parachute, which accounts for their wide distribution. Asexual propagation is generally practiced, since seeds are not easily obtained. Only a few of the principal tillandsias are described here.
Tillandsia bulbosa is a botanical oddity, its rosette, swollen at the base, being similar to an onion. Its leathery leaves are turned and twisted and rolled inside, so that the inflorescence emerges as if coming out of a channel. The flowers are purple with white tips. Similar in appearance is *T. caput-medusae* with flowers of a more bluish tinge. Both are epiphytic bromeliads from Central and South America. SL-ME-FL-FO.
Tillandsia cyanea is one of the most widely cultivated tillandsias. Its narrow, channeled leaves are decorated with reddish brown, longitudinal lines. The inflorescence is a plump feather with bright pink bracts; the flowers are large and of a deep purple. *T. cyanea,* from Ecuador, suckers easily and will grow into a compound specimen plant, naturally and without any help from the grower. L-ME-FL.
Tillandsia fasciculata is the well-known "airplant" of Florida. Its very colorful inflorescence, with orange-red bracts, carries blue or purple, tubular flowers. There are several varieties of this species, native also to Central America—all with beautiful, stiff, silvery rosettes. SL-ME-FL.
Tillandsia flexuosa. The silver crossbands on the coppery green, twisted leaves are the attractive feature of this plant, a native of Florida and South America. Its inflorescence has rose-colored bracts and white flowers. DL-ME-FO.
Tillandsia imperialis, one of the largest epiphytic bromeliads, is hardly a suitable house plant; but it is frequently used at Christmas to decorate churches, because the inflorescence shines as if it were a bright red candle with purple flowers. It is native to Mexico.
Tillandsia ionantha, also from Mexico, is a dwarf epiphytic bromeliad, hardly more than three to four inches high. The small plant is covered completely with silver-gray scales, which make the leaves look as though they were dusted with powdered sugar. The inflorescence of this miniature bears bright violet, tubular flowers. DL-ME-FO-FL.
Tillandsia lindenii, similar in growing habit to *T. cyanea,* has long, narrow leaves with reddish, longitudinal pencil-lines. Its inflorescence, a plume, is longer than that of *T. cyanea* and of a lighter pink. The flowers are blue. The species is native to Peru. L-ME-FL.
Tillandsia punctulata is a very graceful, feathery bromeliad, sometimes referred to as one of the "air plants," on tree tops of Florida and Mexico. The narrow, very pointed leaves are recurved and form a dense, silver-gray rosette. The inflorescence is covered with bright pink to rose-red bracts; the dark purple flowers have white tips. DL-ME-FO-FL.
Tillandsia usneoides, the Spanish moss, is found from the southern United States southward to Chile and Argentina. Its thread-like structure is suspended in huge masses from trees, telephone wires, and similar supports. The Spanish moss is used commercially for several purposes. Its hairlike or beardlike appearance has become a significant trademark of the South.

Vriesea. This genus was named in honor of Professor De Vriese, a botanist in Amsterdam during the first half of the nineteenth century. *Vriesea,* closely related to *Tillandsia,* contains more than one hundred and fifty species and many hybrids. Most vrieseas are epiphytes in the forests of Brazil. Many make good house plants and therefore have been grown commercially to a great extent. Two groups, particularly, are of great ornamental value: those with colorful foliage and those with brilliant flower spikes—some of them branched. Most of the species are the typical tank or vase plants whose smooth-edged leaf-rosettes should be kept filled with water at all times.
Vriesea barilletii is one of the members of the genus that are often called "parrot's feather" or "painted feather," referring to the flat inflorescence of red and yellow. *V. barilletii,* from Ecuador, has been much used for hybridizing. L-ME-FL.
Vriesea carinata from Brazil forms a dense, small rosette of light green leaves and produces a flat inflorescence of red, yellow-tipped bracts. The flowers are yellow, as are those of *V. barilletii. Vriesea* × *Mariae* is a hybrid of *V. carinata* but larger and stronger; it is best known as "painted feather." Its flowers are tubular, waxy, and yellow, tipped with green. L-ME-FL.
Vriesea fenestralis is a decorative Brazilian species. The ornamental light green leaves are marked with dark green and purple pencil-lines crossing each other as if a network were covering the leaves. The inflorescence is dotted with many brown spots. The flowers are yellow. L-ME-FO.
Vriesea fosteriana has an erect rosette of stiff, bluish green leaves which are marked with wavy, dark green and maroon lines; these markings are a darker maroon on the under surface. The showy inflorescence bears light yellow flowers. This bromeliad from Brazil is an excellent house plant. L-ME-FO-FL.
Vriesea hieroglyphica is deservedly called the "king of bromeliads." The descriptive name of the species refers to the zig-zag purple to black mottling on the glossy, green leaves. These markings appear as if hieroglyphics were tattoed on the leaf blades. The flower-spike is well branched and bears yellow flowers. There are two varieties of this Brazilian species; one named *V. hieroglyphica* 'Marginata' has broad, marginal, ivory-colored bands, and the other, *V. hieroglyhpica zebrina,* has more distinct crossband markings. L-ME-FO.
Vriesea splendens was introduced to cultivation in 1840 and has become well known and widely cultivated as the "flaming sword." The name refers to the flaming red, sword-shaped inflorescence. A stronger and better-colored variety, *V. splendens* 'Major', is now grown commercially. 'Major' has broad, leathery, bluish green leaves which are decorated with distinctive, wide, purple crossbands, darker and more pronounced on the under surface. This species comes from French Guiana and Devils Island. L-ME-FO-FL.

Wittrockia superba, named for the Swedish botanist Veit B. Wittrock, has glossy, bronze-green leaves which have showy, reddish, marginal teeth. Its dense rosette resembles that of a *Nidularium* or a *Neoregelia* in shape and structure; it is no wonder that it often goes under the name of *Nidularium. W. superba* is native to Brazil. L-MT-FO.

That rarer, fairer flower am I,
I bud and bloom so gayly
Here in mine arbor, tended by
The heedful warden daily;
With clustering petals breathing out
Voluptuous perfume round about,
And thousand glowing colors shewing.

The brilliant Pink let no man slight,
The gardener's minion-floweret,
Now must it bask in garish light,
Now shadow must embower it;
But such will never heal my woe.
Mine is a meek-eyed flower and, though
Serene and tender, hath no splendor.

JOHANN WOLFGANG VON GOETHE (1749-1832)

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

BOTANICAL ILLUSTRATIONS

A CATALOGUE OF REDOUTÉANA EXHIBITED AT THE HUNT BOTANICAL LIBRARY 21 APRIL —1 AUGUST, 1963. 117 pages, illustrated (part colored), bibliography, indexed. Hunt Botanical Library, Carnegie Institute of Technology, Pittsburgh, Pa. 1963. Paper, $5.00.

This fine volume completes a project, planned by the late Rachel McMasters Miller Hunt, for an exhibit from the collection of Redoutéana in the Hunt Botanical Library and for the production of a fully annotated and illustrated catalog of the 203 items in the collection of books, prints, paintings, and autograph letters of Pierre-Joseph Redouté that she had assembled over a long period of years. Mrs. Hunt took an active part in the plans for the exhibit and read and edited many of the notes in the catalog. She did not live to witness the formal opening of the display in April of this year nor to see the completion of this impressive catalog. In the Foreword, Dr. George H. M. Lawrence has written an eloquent and personal tribute to Mrs. Hunt. The catalog is arranged in four sections: "Redouté—Peintre de Fleurs" by Frans A. Stafleu; "Books Illustrated by Redouté" by Ian MacPhail; "Redouté's Drawings, Paintings, and Prints" by John V. Brindle; and "Letters and Documents by Redouté" by André Lawalrée.

NATURAL HISTORY DRAWINGS IN THE INDIA OFFICE LIBRARY. Archer, Mildred. 116 pages, illustrated (part colored), bibliography, indexed. (Commonwealth Relations Office, London). British Information Services, New York. 1962. $5.50.

An important annotated catalog of some five thousand drawings of Indian and southeastern Asian birds, animals, and plants in the India Office Library in London. For the most part, these illustrations are the work of nineteenth-century Indian and Chinese, as well as European artists. Mrs. Archer presents valuable historical and biographical data concerning the collectors and the artists.

BOTANY TEXTS

GENERAL BOTANY: LABORATORY EXERCISES. Grove, Alvin R., Jr. 173 pages, illustrated. Burgess Publishing Co., Minneapolis, Minn. 1963. Spiral, $3.50.

This comprehensive laboratory manual, written especially for use with the college textbook *Botany*, third edition, by Hill, Overholts, Popp, and Grove (McGraw-Hill, 1960. $8.95) includes numerous suggestions for experiments followed by pertinent questions.

THE GROWTH OF PLANTS. Fogg, G. E. 228 pages, illustrated, bibliography, indexed. (Pelican Books) Penguin Books, Baltimore, 1963. Paper, $1.65.

A readable introduction to the study of plant physiology with a minimum of complicated chemical formulae. Dr. Fogg is Professor of Botany at Westfield College, London.

PLANT KINGDOM LABORATORY SYLLABUS. McKnight, Kent H. 135 pages, illustrated. Burgess Publishing Co., Minneapolis, Minn. 1962. Spiral, $3.75.

This laboratory notebook offers fifteen exercises in plant classification, based on living material, and contains data sheets for drawings, observation notes, and answers to the questions that occur in the text. The classification system is that proposed by Dr. Arthur Cronquist.

REGIONAL BOOKS

1001 ANSWERS TO YOUR FLORIDA GARDEN QUESTIONS. Wolfe, H. S., J. V. Watkins and T. B. Mack. 235 pages, illustrated, indexed. (Know Your Florida Series) University of Florida Press, Gainesville, Fla. 1962. $5.50.

In 1957 there appeared *500 Answers to Your Florida Garden Questions*. Five years later, the authors, convinced that there was a need to expand the early volume, have doubled the number of questions and answers in this present edition. It is designed as a companion volume to *Your Florida Garden*, fourth edition (1961), by Watkins and Wolfe, which is an excellent text with detailed information on specific plant subjects.

OUTDOOR LIVING. Bale, Robert O. 199 pages, illustrated, bibliography. (Burgess Camping Series) Burgess Publishing Co., Minneapolis. 1961. Spiral, $3.00.

In order to live comfortably in the out-of-doors, it is necessary to acquire camping skills and to learn the wise use of native plants and animals. Here is a sensible guide containing data on edible wild plants, poisonous or unpalatable plants, wild greens and potherbs, edible wild fruits, woods for tinder, kindling wood, coaling wood—to name only the botanical items of interest.

THE STATE PARKS; THEIR MEANING IN AMERICAN LIFE. Tilden, Freeman. 496 pages, illustrated (colored frontispiece), indexed. Alfred A. Knopf, New York. 1962. $5.50.

This stupendous compendium of detailed information and illustrations of about two hundred of our important state parks, will serve not only as a stimulating guide but also as an absorbing chronicle of the history, lore, policies, and uses of our state parks. It is a companion volume to the author's *The National Parks, What They Mean To You and Me.*

GREENHOUSE AND HOUSE PLANT CULTURE

EXOTICA 3; PICTURAL CYCLOPEDIA OF EXOTIC PLANTS; GUIDE TO CARE OF PLANTS INDOORS. Graf, Alfred Byrd. 1,828 pages, 12,025 illustrations (291 plants in color), bibliography, indexed. Roehrs Company, Rutherford, N. J. 1963. Single Volume Edition: $38.00; Two-Volume Library Edition: $45.00.

Indefatigable Mr. Graf, well-known to us at The New York Botanical Garden as nurseryman, horticulturist, author, photographer, and traveler, has reached another monumental horticultural goal with the completion of his *Exotica 3* —a stupendous task which few persons today would have dared to undertake. It was in 1957 that *Exotica 1* appeared with 643 pages and 4,000 illustrations; in 1959 *Exotica 2* was published with 1,149 pages and 7,600 illustrations. The present volume has many noteworthy features—a tremendous increase in the number of pages and illustrations (with many more in color), a horticultural color guide, a tabulation of foot-candle readings for plants grown with incandescent lamps, a key to cultural notes in five languages, namely, English, Spanish, German, French, and Russian, and an extensive bibliography of botanical and horticultural references. No other book of its kind exists—it is a truly great and valuable reference work for amateur and professional growers of indoor plants and for librarians who serve plant-minded readers.

SPECIAL KINDS OF PLANTS

COMMERCIAL PRODUCTION OF POT PLANTS, 3rd ed. (Great Britain. Ministry of Agriculture, Fisheries, and Food Bull. No. 112) 77 pages, illustrated, indexed. British information Services, New York. 1962. Paper, $1.40.

Although written for British growers, this concise little booklet contains much cultural information, including propagation notes, that will be useful to American house-plant and greenhouse gardeners.

TREES AND FORESTRY

A HANDBOOK OF HARDWOODS. 269 pages, indexed. (Great Britain. Department of Scientific and Industrial Research. Forest Products Research) British Information Services, New York. 1962. $4.00.

Full descriptions and uses of 151 timbers and brief notes on sixty-four—all of these woods occur in the United Kingdom market. Especially useful is the index to vernacular, trade, and scientific names.

MISCELLANEOUS TITLES

HOW TO PRESERVE ANIMAL AND OTHER SPECIMENS IN CLEAR PLASTIC. Harden, Cleo E. 64 pages, illustrated, bibliography, indexed. Naturegraph Co., Healdsburg, Cal. 1963. Paper, $1.00; Cloth, $2.50.

Mostly concerned with simple techniques for embedding animal specimens in plastic. The author states, "Flowers and botanical specimens have likewise been successfully embedded in full color without fading."

HOW TO WRITE AND SELL FOR THE OUT-OF-DOORS. Scott, Jack D. 230 pages, The Macmillan Co., New York. 1962. $5.95.

For the potential free-lance author who needs guidance in writing and marketing manuscripts, written by a former war correspondent and syndicated columnist who knows some of the ways and means of overcoming "rejection slips." Contains useful listings of magazines with average payment ranges given for each publication.

OUTDOOR LIGHTING FOR YOUR HOME. Schuler, Stanley. 192 pages, illustrated, indexed.

D. Van Nostrand Co., Princeton, N. J. 1962. $5.95.

Here is a helpful answer to the numerous requests we receive for information on garden lighting. Mr. Schuler, a suburban home owner and formerly associated with the General Electric Company, has endeavored to cover many phases of this subject and discusses fixtures, wiring, installation, colored lights, sources of supplies, and even the bug nuisance. He has written at length on lighting ideas for Christmas and for other special occasions.

FLOWER ARRANGEMENT AND DESI GN

DESIGN FOR FLOWER EMBROIDERY. Geddes, Elisabeth. 103 pages, illustrated (part colored), bibliography. Taplinger Publishing Co., New York. 1962. $5.95.

Flower motifs in designs for embroidery discussed and described by an Assistant Examiner for the City and Guilds of London Hand Embroidery Examinations, who is at present with the Department of Textiles, Victoria and Albert Museum.

FLOWER ARRANGEMENTS; DESIGNS FOR TODAY. Wilson, Helen Van Pelt, ed. 262 pages, illustrated (part colored), indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $5.95.

One hundred new and unpublished photographs of flower arrangements (with brief descriptive and analytical notes) by thirteen "top" arrangers, selected by the editor of *The Flower Arrangement Calendar* (now in its seventeenth year). Mrs. Wilson has written an excellent introductory survey of present-day trends in flower arrangement and especially interesting biographical sketches of each of the arrangers.

FLOWERS: CREATIVE DESIGNS; GEOMETRIC ANALYSIS, new ed., rev. Benz, Morris. 287 pages, illustrated (part colored). San Jacinto Publishing Co., Houston, Texas. 1962. $15.00.

Morris Benz wrote his first book on flower arrangements with the title *Flowers: Their Creative Designs: Descriptive Analysis* in 1952. Since that time Mr. Benz, who is the director of the Benz School of Floral Design, has toured the world, studying the ornamental uses of flowers in homes, in religious ceremonies, and in public festivals. With a rich background of new floral design observations, he has now written this revised edition with a slightly modified title and with over three hundred plates, a few of which are in color.

GARDEN CLUBS

THE NEW PROGRAM PATTERNS. Mayes, Fay McW., ed. Edited for the Florida Federation of Garden Clubs, Inc. 91 pages, illustrated, bibliographies. (A National Book) National Council Books, Philadelphia. 1962. Paper, $2.00; Cloth, $3.00.

Garden club program chairmen will find new and inspiring suggestions in this revised edition of ideas for garden club meetings, lectures, projects, flower shows, quizzes, and skits.

BIOLOGY, MICROBIOLOGY AND BIOCHEMISTRY

AIDS TO BIOCHEMISTRY, 6th ed. Datta, S. P. and J. H. Ottaway. 327 pages, illustrated, indexed. (Students' Aids Series) Williams and Wilkins, Baltimore. 1962. $3.75.

To this sixth edition of a standard introductory text has been added new material on protein, amino-acid, and nucleotide metabolism. There is little about plant or microbiological chemistry.

ANIMAL BEHAVIOR. Scott, John P. 331 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1963. Paper, $1.45.

A paperback edition of Dr. Scott's fascinating survey of animal psychology which was originally published in 1958.

BIGGER'S HANDBOOK OF BACTERIOLOGY FOR STUDENTS AND PRACTITIONERS OF MEDICINE; 8th ed. Stewart, F. S., ed. 640 pages, illustrated (part colored), indexed. Williams and Wilkins Co., Baltimore. 1962. $9.00.

A new edition with extensive revisions in the sections on virology, disinfection and immunity, and a new chapter on the pathogenic fungi.

A DICTIONARY OF BIOLOGY. Abercrombie, M., C. J. Hickman and M. L. Johnson. 254 pages, illustrated. Aldine Publishing Co., Chicago. 1962. $5.00.

This up-to-date dictionary of several thousand words, first published in 1951, has appeared in several revised editions. Of the three authors, one is a botanist, two are zoologists.

ENERGY EXCHANGE IN THE BIOSPHERE. Gates, David M. 151 pages, illustrated, bibliography, indexed. (Harper and Row Biological Monographs) Harper and Row, New York. 1962. Paper, $3.75.

Based on a series of lectures given to a seminar at the University of Minnesota during October 1960. Discussion of solar radiation; infrared; thermal radiation from the atmosphere, the ground and surrounding objects; the transfer of heat by convection; and the role of transpiration or evaporation in exchanging heat and maintaining the plant or animal at tolerable temperature level.

MODERN MICROBIOLOGY. Umbreit, Wayne W. 507 pages, illustrated, bibliography, indexed. (separately included: Teachers Manual for Modern Microbiology) (A Series of Books in Biology) W. H. Freeman and Co., San Francisco. 1962. $8.50.

Dr. Umbreit, of Rutgers, The State University, has written a modern textbook, profusely illustrated with over three hundred photographs, line drawings, and diagrams. At the end of each chapter there is a list of pertinent questions and a selection of titles for collateral reading. The supplementary *Teachers Manual* contains useful suggestions, ideas, and quizzes. A most attractively presented textbook for high school and first-year college students and for the general lay reader.

PLANT BIOLOGY TODAY; ADVANCES AND CHALLENGES: A Symposium Sponsored by the American Association for the Advancement of Science and the Botanical Society of America. Jensen, William A. and Leroy G. Kavaljian, eds. 114 pages, illustrated. Wadsworth Publishing Co., Belmont, Cal. 1963. Paper, $1.95.

Papers read by James Bonner, William A. Jensen, Lawrence Bogorad, Beatrice M. Sweeney, and Frank B. Salisbury on the subjects of molecular botany, cell development, photosynthesis, measurement of time in plants, and translocation.

REVIEWS OF BOTANICAL BOOKS

MORPHOLOGY AND EVOLUTION OF FOSSIL PLANTS. Delevoryas, Theodore. 189 pages, illustrated, indexed. Holt, Rinehart and Winston, Inc., New York. 1962. $4.50.

Delevoryas' new book, although not a paleobotanical "text" in that sense, is an "event" long overdue in that it offers a refreshingly new point of view and approach to the presentation of fossil non-vascular and vascular plants. The latest discoveries in the field are integrated with authority and conviction in a completely original manner. Most of the research that has gone into this volume stems from the author's own, most competent investigations. In strict adherence to the title, the author has trimmed much peripheral information which may be found in any text. This procedure makes the book a veritable storehouse of concentrated information. It develops the phylogenetic history of fossil plants and correlates it with that of our living flora. A keen sense of analysis and stress of principles in evolution pervades the book, all based on anatomical and morphological evidence. It is only natural that the treatment of angiosperms is rather short, since they represent the end product of phylogenetic development and cannot, therefore, contribute much to the evolutionary history of the plant kingdom.

At its moderate price, the book is excellent as a morphology text for phylogeny and evolution, as a supplementary text for concentrated courses in paleobotany, and as a historico-morphological book in conjunction with plant morphology and evolution of our living flora. With a geologic time scale brought up-to-date through the latest radio-isotope measurements (Kulp, Science, 1961), phylogeny is viewed in proper perspective of age relationship. Excellent line drawings enhance the appeal of the book. One has the feeling of a fresh spring breeze blowing the dust and cobwebs out of the old and stale attic.

HERMAN F. BECKER

NORTH AMERICAN SPECIES OF HYGROPHORUS. Hesler, L. R., and Alexander H. Smith, vii+416 pages, illustrated, indexed. University of Tennessee Press, Knoxville. 1963. $12.00.

Species of *Hygrophorus*, often referred to as the waxy-gilled mushrooms, are among the most conspicuous and colorful fungi in our flora. Most are small and of no interest to the mycophagist; a few are large and edible.

Drs. Hesler and Smith have written a scholarly monograph of the first-order of excellence. The volume contains a detailed account of the history, classification, morphology, ecology, geography, and phylogeny of *Hygrophorus* and includes keys and descriptions of 244 species, varieties and forms (42 new to science). Some 116 black and white half-tones compliment the descriptions. A single full-color photograph on the cover demonstrates the bright scarlet color typical of some species.

CLARK T. ROGERSON

(Continued on page 160)

1963 SPRING GARDEN TOUR

TO NORTH SHORE OF LONG ISLAND

sponsored by The Volunteer Associates

The New York Botanical Garden

Photographs by Walter Singer

Legends by Phil Clark

An early American atmosphere prevails in the charming home, portions of which were built before the Revolution, and gardens of Mr. and Mrs. Reginald P. Rose at Oyster Bay, Long Island. The landscaping was done in 1932 by the late Miss Marion Coffin, and the plants are typical of eighteenth-century America. On the upper terrace is a remarkable apple tree, said to be the largest and oldest on the Island. Right. A beautiful archway between house and garden with early American ornaments.

The drive up the cliffside on which Rockledge, the residence of Mr. and Mrs. William R. Coe, Jr., is superbly situated, is flanked on either side with extensive plantings of azaleas and perennials, their beauty enhanced by several unusual cascade pools. Right. Mr. Coe greets some of his visitors from the Spring Garden Tour in the courtyard adjoining his residence in Mill Neck.

A series of informal, but carefully conceived gardens have been developed on the Jean Cattier property at Martinecock during the past forty years, on a hillside sloping down to a lake---a primrose garden, a rock garden, a heather garden among others.

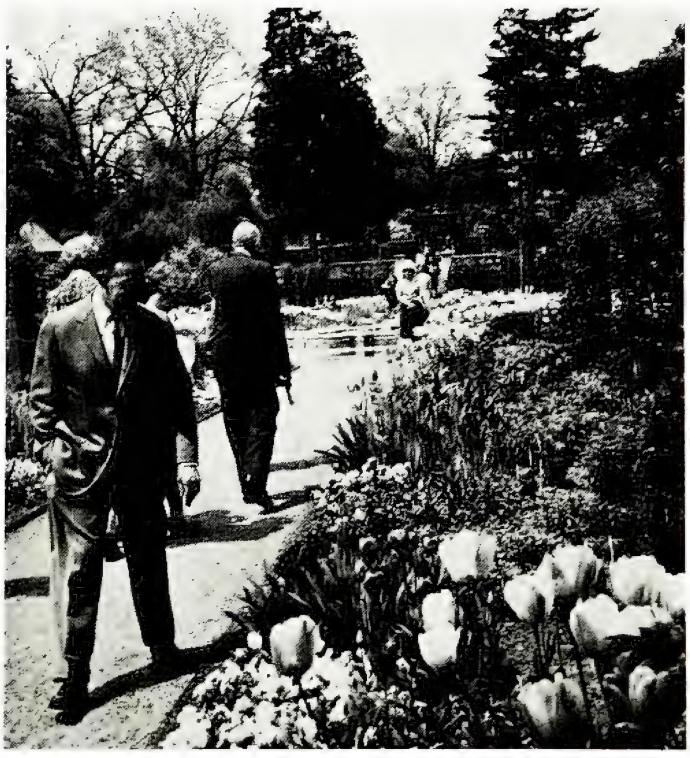
Visitors are fascinated by the strange-looking, cream-white bracts and inconspicuous flowers on the dove tree *(Davida involucrata),* in Mr. Cattier's garden.

Japanese primroses grow beneath an authentic Indian circle of large, old trees at Chelsea.

These coiled arborvitae at Chelsea, the residence of Mrs. Robert Gordon McKay at Syosset, are fine examples of the topiary art.

Mrs. Robert A. Lovett stands beneath a gigantic copper beech, reputed to be three hundred years old. Pleasance reflects her creative interest in gardening, for she does much of the gardening on her intensively and attractively cultivated home grounds at Locust Valley.

In the small private garden near Mrs. Lovett's home, St. Fiacre, patron of gardens, and St. Frances, a gentle friend of nature, stand among tree peonies, irises, tulips, dianthus, and other spring and early summer flowers. The watering can at the far end of the center bed is a seventeenth-century French antique.



Jerome A. Eaton, Director of Westbury Gardens, Old Westbury, is evidently pleased with the splendid showing the tulips made on the day of the Spring Garden Tour. Walking in the opposite direction is John H. Beale, formerly Superintendent of Boyce Thompson Arboretum, Yonkers, New York, and one of the consultants on the tour.

Participants in the 1963 Spring Garden Tour enjoyed lunch on the broad terrace of Westbury House, overlooking the "Great South Lawn."

Day and Evening Courses
in
BOTANY and HORTICULTURE

Write for a copy of the *Educational Program* which describes the Two-Year Courses in Botany, Practical Gardening, and Landscape Gardening, and Short Courses in House Plants, Pruning, Lawns and Groundcovers, the Art of Bonsai, and other subjects.

THE NEW YORK BOTANICAL GARDEN
Bronx Park Bronx 58, N. Y.

NEWS, NOTES and COMMENTS

Annual Meeting. "Exploration of inner space can be as exciting an adventure as that of outer space," stated Charles B. Harding, President of The New York Botanical Garden, in his annual report presented at the annual meeting on May 6, 1963.

"The research at The New York Botanical Garden, perhaps, is not so glamorous as Project Apollo but it may have more significance for the welfare of mankind . . We are investigating what I call 'inner space,' that is, the composition of the molecules that make up the various elements in the plant world. We are seeking ways to make plants more useful to man from the standpoint of food, medicine, and industrial uses."

The importance of this research is underlined, Mr. Harding's report continued, by the grants to the Garden totaling over $1,195,000 from the National Science Foundation, National Institutes of Health, Damon Runyon Fund for Cancer Research, U. S. Army Engineers, Atomic Energy Commission, and Office of Naval Research.

Dr. William Steere, Director, described the plant expeditions to various countries, the development of a better Museum and Library, additions to the Herbarium, the work in the Research Laboratory and in the Gardening and Education Departments.

Reports were given by Mrs. Leighton H. Coleman for the Volunteer Associates, Mrs. Edward C. Delafield for the Advisory Council, and Mrs. Hermann G. Place on the addition to the Library.

Distinguished Service Awards were presented to Edward C. Delafield, Riverdale, New York, and to Dr. David D. Keck, Washington, D. C., Deputy Assistant Director for Biological and Medicinal Sciences, National Science Foundation.

The citation, accompanying the award to Mr. Delafield, was read by Dr. P. P. Pirone, Senior Plant Pathologist. "Edward C. Delafield, a man of many talents, descends from a most distinguished family, one of his direct ancestors being a signer of the Declaration of Independence. Mr. Delafield was born on Long Island and was educated at Princeton University from which he received an A. B. degree in 1899.

"Mr. Delafield has had an outstandingly successful career in banking, for the last quarter century heading his own brokerage firm and serving as trustee or director of banks and corportations as well as of several philanthropic institutions. He served also with distinction in the United States Army.

"However, The New York Botanical Garden wishes to honor him in a quite different capacity. In taking time out of a busy life, Mr. Delafield has followed developments in the science and art of horticulture with ardent interest and has always shown the most warm sympathy for others with a beginner's interest in the field. His abilities have gone beyond the level of the purely intellectual to that of practical accomplishment. This is demonstrated in his own outstanding garden in Riverdale which is noted for its excellence; his estate reflects the skill of a true landscape artist.

"To The New York Botanical Garden he has been a real friend and advisor. Besides sharing with us his plant material, he has always opened his garden, greenhouse, and grounds for the use and study of classes from the Garden."

The citation accompanying the award to Dr. Keck was read by Dr. Pierre Dansereau, Assistant Director (Botany). "David Daniels Keck was born in Omaha, Nebraska, in 1903, in the very heartland of America whence so many of our great men have come that it is tempting to believe that a "wind of fruitfulness" blows there. However he may have breathed the invigorating air of the steppes as a child, his formative years were spent in sunny California. Pomona College gave him a B.A. in 1925, an M.A. in 1926. At that time he was also a teaching fellow there and already definitely committed to plant taxonomy. He obtained his Ph.D. from the University of California in 1930. His teacher was one of the great men in this field: H. M. Hall, not content with things as they were, was beginning to design a new approach to the relationships of plants. He was quick to discern the talents and dedication of young Keck and secured his help as an assistant in what had just been named experimental taxonomy at the Carnegie Institution of Washington's new laboratory on the Stamford campus.

"Thus began a project with which David Keck was associated for a quarter of a century. This period, which was so meaningful to him, was rich in revelations for the rest of us. Unfortunately, Hall did not live to witness the full development of his plan and the outstanding success of his collaborators, Jens Clausen, David Keck, and William Hiesey. An abundant harvest was reaped in those years, thanks to such exemplary teamwork. It can be said that much seed was then sown for the generations to come. Many honors were also gleaned, one of them the Mary Soper Pope Medal, bestowed by the Cranbrook Institute of Science in 1950.

"But it is for his accomplishments at The New York Botanical Garden that we seek him out today and in recognition of the lasting influence which he has had on our development. In 1951 he was appointed Head Curator of The New York Botanical Garden; in 1955 he also bore the title of Assistant Director, and in 1957-1958 he was Acting Director. During this ten-year period, David Keck recommended and obtained several appointments which proved his good judgment of men and allowed him to continue in the footsteps of Britton, Rydberg, Small, and Merrill. There is probably no greater satisfaction for a true taxonomist than the thrill of responsibility for a great collection which is at the same time an historical monument. With the avuncular aid of Gleason, David Keck maintained and increased the classic collections of the Garden and made the Herbarium an ever more hospitable institution where the great tradition could be continued and broadened to meet new requirements. During his time here he published many influential papers and also, in collaboration with Philip Munz, a long-awaited Flora of California. Those who had the privilege of working with him well remember his good cheer which had the ring of a steel chord. Indeed, his qualities of exacting self-discipline combined with kind understanding endowed him admirably for high responsibility.

"His judgment of men and his evaluation of new projects had long been valued by his fellow-scientists. It was not surprising that the National Science Foundation should urge him to play a major role in the systematic biology program, for which he accepted responsibility temporarily in 1959 and permanently in 1960. Last year he was appointed Deputy Assistant Director for Biological and Medical Sciences. If it may be said of some painters that they went through a pink period, a green period, a blue period, it is no less true of many scientists. It is just possible that David Keck's present period is a golden one, although we cannot yet speak of the crowning achievement of a man who has just hit a new stride and from whom science expects many years of constructive leadership.

"It is a matter of great satisfaction to us at The New York Botanical Garden that his name is permanently woven into our tradition. . . "

Activities of the Director and Staff. Dr. William C. Steere, Director, attended the United States-Japanese Biology Conference held in Tokyo, Japan; a meeting of the Committee on Form and Style of the Conference of Biological Editors, revising its published style manual for biological journals; the inauguration of Dr. John W. McConnell as President of the University of New Hampshire at Durham; the dedication ceremonies at the Brooklyn Botanic Garden of a replica of the famous stone garden at Ryoanji Temple in Kyoto, Japan.

Dr. and Mrs. Steere will spend July and part of August in field work on bryophytes in Arctic

Below. Oakleigh L. Thorne, a member of the Board of Managers, congratulates Dr. David D. Keck as he presents the Distinguished Service Award of The New York Botanical Garden to him.
Right. Edward C. Delafield addresses a few remarks to the members who attended the annual meeting, in accepting the Distinguished Service Award.

Alaska under a grant from the Arctic Institute of North America. The latter part of August he will attend the Adamson Bicentennial Symposium at the Rachel McMasters Miller Hunt Botanical Library in Pittsburgh. He will participate in the meetings of the American Institute for Biological Sciences to be held at the University of Massachusetts, in Amherst, on August 27-31, 1963.

Dr. Pierre Dansereau, Assistant Director (Botany) and Senior Curator of the Library, attended a conference on vegetation mapping, held at Vicksburg, Mississippi, with personnel of the United States Army Corps of Engineers (Waterways Experiment Station) and invited consultants. On June 22, Dr. Dansereau gave the dedication address at the Alpine Laboratory of the Mountain Research Station, University of Colorado, Boulder. The August, 1963, issue of the *Newsletter,* published by Cranbrook Institute of Science, will carry an article by Dr. Dansereau on "Edge of Melanesia."

Dr. Bassett T. Maguire, Head Curator and Coordinator of Tropical Research, flew to Brasilia, Brazil, in April, 1963, to discuss a plant resource study which is being planned by leaders of Brazil's new national university. He also advised them on a proposed herbarium. Dr. Maguire visited Paramaribo, Surinam, where he completed arrangements for an expedition of The New York Botanical Garden to the Wilhelmina Mountains in west-central Surinam from June to November, 1963.

Dr. Howard Irwin, Associate Curator, is the leader of this forthcoming expedition. Also participating in the expedition are Noel Holmgren, a graduate student at the Garden, Dr. Thomas Soderstrom of the Smithsonian Institute; Dr. Ghilliam T. Prance, who will become a member of the Garden's staff, when he joins the field party in Surinam the end of August; and several Surinam naturalists.

Dr. Caroline K. Allen, Research Associate, will attend the Segundo Congreso Mexicano de Botánica, San Louis Potasi, S. L. P., September 17-21, 1963. After the Congress and a scheduled trip to Chiapas, Dr. Allen will continue observations in the cloud forest of the area on the *Lauraceae* (Laurel Family).

Dr. P. P. Pirone, Senior Plant Pathologist, addressed the New York Chapter of the American Society of Landscape Architects, the Englewood Garden Club, and the Five Towns Garden Club. He appeared on Ed Joyce's CBS radio program and on the television program, "Answering Service," on WABC with Darren McGaven as guest-host.

Dr. Clark T. Rogerson. Curator of Cryptogamic Botany, lectured on "Amanitas of Eastern North America" before the New York Mycological Society.

Mrs. Mary Fleming, Technical Assistant, discussed "Rhododendrons, especially the Dwarfs, in the Garden" before the Princeton Chapter of the American Rhododendron Society. She was hostess at a meeting of the New York Microscopical Society at its recent visit to the Cryptogamic Herbarium; the members of the Society toured the Garden and had lunch in the Seminar Room.

Susan Canham resigned her graduate fellowship at the Garden but will continue to work for her doctorate under Dr. Rogerson's direction. Her thesis will deal with the taxonomy of the imperfect fungi associated with hypocreaceous *Ascomycetes.*

Jaõa Furtado of the Instituto Botánico, São Paulo, Brazil, received a graduate fellowship at the Garden effective July 1, 1963. Mr. Furtado is working half-time in the Cryptogamic Herbarium and continuing his taxonomic studies of the genus *Amauroderma (Polyporaceae).*

Dr. David J. Rogers, Curator of Quantitative Taxonomy, recently completed a series of seminars for the Garden's staff on the use of computers. He attended the annual meeting of the Society for Economic Botany held in April, 1963, at Madison, Wisconsin, as an officer of the Society. He is Managing Editor of *Economic* Botany. Dr. Rogers gave a seminar for the Biological Department of the University of Southwestern Louisiana on *Manihot,* and collected in that area and around Tallahassee, Florida, in May. He expects to attend the meetings of the American Institute of Biological Sciences to be held at the University of Massachusetts in August and the Segundo Congreso Mexicano de Botánica, San Luis Potasi, S. L.P., in September.

Henry Fleming, Research Associate, attended the Joint Computer Conference at Cobo Hall in the Civic Center of Detroit, Michigan, May 21-23, 1963. This was the twenty-third conference held under the auspices of the American Federation of Information Processing Societies or its predecessor the National Joint Computer Committee. Mr. Fleming is assisting Dr. Rogers in his program on the uses of computers in taxonomy.

Dr. Alma W. Barksdale, Senior Research Associate, will present a paper describing a new species of *Achlya* at the annual meeting of the Mycological Society of America to be held during the meetings of the American Institute of Biological Sciences at the University of Massachusetts.

Dr. David Davis, Research Associate, led the discussion after the lecture on "Movement of Biologically Active Compounds Within Plants" by Dr. John Mitchell of the United States Department of Agriculture, Beltsville, (Maryland) Station. The lecture and discussion were part of the symposium commemorating twenty-five years of plant pathology at the Connecticut Agricultural Experiment Station, New Haven.

Dr. Herman F. Becker, Research Associate, attended meetings of the Pennsylvania Academy of Science, held at Stroudsburg, at which papers were presented on local geology with reference to paleobotanical outcrops; conducted a field trip to Sparrowbush-Hawksnest near Port Jervis, New York. for a group of graduate students of Yale University, under Dr. Theodore Delevoryas. Fossil Devorian plants of *Aneurothyton (Eospermatopteris)* were incorporated in the Garden's fossil collection. Dr. Becker conducted a field trip of the Torrey Botanical Club to Palisades, New Jersey, for spring flowers, cliff vegetation, and the geology of the area. In August Dr. Becker will visit the University of Michigan to select plant and insect fossils, which he collected in the Ruby Flora (Montana) area, in preparation for an article to be published in *Natural History.* He will confer with Dr. E. E. Leppik, at Iowa State University at Ames, on plant-insect relationship in evolution, and will attend the meetings of the American Institute of Biological Sciences to be held at the University of Massachusetts, at Amherst, in August, 1963.

Mary Gibson Henry of Gladwyne, Pennsylvania, with some of the medals she has received for botanical exploration and collection. An exhibition of Mrs. Henry's botanical works opened in the Museum and Administration Building of The New York Botanical Garden on June 1 and will continue until November 15, 1963.

Frank C. MacKeever, Custodian of the Herbarium, gave a talk recently before the Tuxedo Park Garden Club and will give a talk before the Phillipstown Garden Club in August. Mr. MacKeever will again spend some time this summer botanizing on Martha's Vineyard and Nantucket Island and addressing various groups on the native plants of that area.

Dr. Edmund H. Fulling, Honorary Curator, spent several days, after the Wildflower Pilgrimage at Gatlinburg, Tennessee, at Cape Romain and Bull's Island, wildlife preserves of the United States Fish and Wildlife Service. Two hundred and thirty-five species of birds have been recorded on this one island. Dr. Fulling saw deer and wild turkeys roaming together in the back yard of the guest house and alligators in the ponds. He attended the symposium on "Meristems and Differentiation," held at Brookhaven National Laboratory at Upton, Long Island, on June 3-5, 1963. He will participate in the field trip to White Face Mountain in the Adirondacks, that has been arranged for the Botanical Section of the American Institute of Biological Sciences before the meetings to be held at the University of Massachusetts.

Scholarships in Mycology. Two Gertrude S. Burlingham Scholarships in Mycology have been awarded by The New York Botanical Garden for the summer of 1963. Each includes a stipend of $800.

Philip M. D. Martin, a British and South African citizen, who is completing his doctorate at the University of California at Los Angeles, will engage in research in fungi *(Xylariaceae).* Mr. Martin plans to study the five thousand or more specimens of *Xylariaceae* in the Cryptogamic Herbarium and hopes to do some culture work in the laboratory.

Bill F. Isaacs, who is working for his doctorate at the University of Michigan, will study the Garden's collection of *Agaricus.*

Henry Allan Gleason Award of The New York Botanical Garden is given annually, through a gift from Dr. Gleason, Head Curator Emeritus, for an outstanding recent professional publication (book or article) in botany. Since Dr. Gleason's own interests have been centered on plant taxonomy, plant ecology, and plant geography, some preference will be given to papers in these fields, but there is no formal restriction. It is expected that the award will be given for a book or paper published during the previous year, but this is not a requirement. There may be occasions when a publication in another field of botany, or one which appeared in a prior year, should be considered. The Award Committee will exercise its own judgment, in keeping with Dr. Gleason's own spirit of free inquiry. A cash grant of at least one hundred dollars will accompany each award certificate.

Publication on the United States Wild Flowers. A five-volume series on the wild flowers of the United States, unprecedented for its scope, is now in preparation at The New York Botanical Garden. Through the use of thousands of color photographs and line drawings, accompanied by non-technical but accurate texts, the books, each covering all the wild flowers of a different section of the country, will simplify the learning process without sacrificing scientific accuracy.

The project was conceived by Mrs. David Rockefeller, member of the Garden's Board of Managers, who, after approval of the proposal by the Botanical Garden, formed a fund-raising committee, known as the National Committee for the Wildflowers of the United States. With nearly a half million dollars already raised by this group, it was possible to begin preparation of the first volume on the wild flowers of the northeastern states in April, 1963.

Dr. William C. Steere, Director, is General Editor. Serving with him, as Senior Botanist and charged with the greater part of the writing, collecting of photographs and line drawings as well as overseeing such explorations as remain necessary, is Dr. Harold W. Rickett.

Each of the five volumes will describe and illustrate fifteen hundred to thirty-five hundred plant species. Most will be shown in color photographs; line drawings, used particularly for their clarity in distinguishing "look-alike" species, will illustrate the remainder.

The five volumes will cover natural zones of plant association, embracing all the United States except Hawaii and Alaska — Northeast, Southwest, Southeast, Pacific Northwest, and Rocky Mountain (also including the Great Plains and intermontane zones).

Visitors to the Garden.

Dr. Tom Dunder of the Biology Department of St. Louis University, has been spending several months as a post-doctoral trainee in the laboratory of Dr. Richard M. Klein, Alfred H. Caspary Curator.

Dr. Carlos Menéndez, Curator of Paleobotany, Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina, is spending three months at the Garden in paleobotanical research.

Three botany classes from Hunter College, New York, N. Y.

Dr. Jan Kohlmayer, Botanisches Museum, Berlin-Dahlen, Germany.

Dr. Ronald H. Peterson, State University of New York at Buffalo.

Dr. Egbert W. Walker, National Arboretum, Washington, D. C.

Dr. C. V. Morton, Dr. Thomas R. Soderstrom, and Edward S. Ayensu, Smithsonian Institution, Washington, D. C.

Mrs. Mary K. Moulton, Morton Arboretum, Ill.

Dr. Theodore Delevoryas, Yale University, New Haven, Conn.

Dr. H. N. Guttmann, Haskins Laboratories, New York, N. Y.

Majorie Pickens, LeClair Lambert, Carol Phillippe, *Life* Nature Series.

Dr. Robert Cockrell, School of Forest, Berkeley, Calif.

Donald Reinhardt, Botany Department, Columbia University, New York, N. Y.

Dr. Billy Tweedy, Boyce Thompson Institute, Yonkers, N. Y.

Dr. Richard A. Howard, Director, Dr. Carroll E. Wood, Jr., Dr. Lorin Nevling, Jr., Judith Kroll, and Dulcie Powell, Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. Ikram Hassan, Fordham University, New York, N. Y.

Dr. H. E. Moore, Jr., Bailey Hortorium, Ithaca, N. Y.

Dr. and Mrs. John H. Beaman, Michigan State University, East Lansing.

Dr. Robert W. Schuhmacher, Newark State College, Union, N. J.

R. M. King, Washington, D. C.

Dr. André Robyns, Jardin Botanique de l'Etat, Brussels, Belgium.

Dr. and Mrs. Rolla Tryon, Gray Herbarium, Cambridge, Mass.

Dr. José Cuatrecasas, U. S. National Herbarium, Washington, D. C.

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Lynn Farnol, a member of the Corporation of The New York Botanical Garden since 1949, died on March 31, 1963. Henry Hart, of Films in Review, has made a contribution to the Garden in memory of Mr. Farnol.

George Moran, Assistant Superintendent of Buildings and Grounds, died suddenly on April 6, 1963. Mr. Moran had been an employee of the Garden since March 1, 1926.

Clarence Kobuski, Curator of the Arnold Arboretum and the Gray Herbarium of Harvard University, Cambridge, Massachusetts, died at the age of sixty-three on May 10, 1963. Dr. Kobuski was a specialist on plants of Asia and responsible for much of the scientific work that resulted from Arnold Arboretum expeditions to China, Japan, and New Guinea.

The Redoutéana Collection of the late Mrs. Roy A. Hunt, considered the largest in the United States, has been on exhibit at the Hunt Botanical Library, Carnegie Institute of Technology, Pittsburgh, since the latter part of April, 1963. It may be seen every Wednesday afternoon until August 1, 1963. The exhibition features original paintings, prints, autograph letters, and books illustrated by Pierre-Joseph Redouté, one of the greatest botanical artists.

BOTANICAL BOOKS (Continued from page 152)

THE MORPHOLOGY OF PTERIDOPHYTES. Sporne, K. R. 192 pages, illustrated, indexed. Hillary House Publishers Ltd., New York. 1962. Price $2.50.

This is an excellent up-to-date review and summary of knowledge about the structure of ferns and allied plants. The author reappraises the older classic theories in light of present knowledge. The recent discoveries of new fossils and the use of new techniques have been included. Living and fossil plants have been given equal importance. The illustrations have been redrawn from published accounts.

The pocket-sized book is well written and is recommended to all who are interested in plants. A useful bibliography is included.

CLARK T. ROGERSON

MUSHROOMS AND OTHER COMMON FUNGI OF THE SAN FRANCISCO BAY REGION. Orr, Robert T. and Dorothy B. 11 pages, illustrated, indexed. University of California Press, Berkeley, Cal. 1962. Paper $1.50.

This is an excellent addition to the popular literature on common mushrooms, how to collect and identify them, where they grow, and their edibility. It is the first guide for the San Francisco Bay region and includes the most commonly encountered gill fungi (56), boletes (4), polypores (4), teeth fungi (3), jelly fungi (3), coral fungi (2), cup fungi (3), morels, saddle fungi, puffballs, earthstars, and bird's-nest fungi. Outstanding is the inclusion of colored photographs of twenty-five species which for the most part are excellently reproduced. A glossary, list of reference, and check-list conclude the booklet. The booklet will be useful in other parts of the United States and in Canada, since most of the included species are widespread.

CLARK T. ROGERSON

NITROGEN METABOLISM IN PLANTS. McKee, H. S. 728 Pages, illustrated, indexed. Oxford University Press, New York. 1962. $16.80.

The processes by which plants absorb, transport, and utilize nitrogen has considerable theoretical and practical importance. For these reasons, there has been a great deal of experimental work on the subject of nitrogen metabolism.

In a field so vast, the problem of making the information available to other research scientists is a difficult one. To some extent, this desirable goal can be achieved through short review articles on limited portions of the field. There is, however, a point beyond which brief reviews are inadequate, and it becomes necessary to write a book which covers the topic. All plant physiologists can be grateful that Dr. McKee has been willing to sacrifice at least several years of his life to prepare the book.

Nitrogen Metabolism in Plants is complete and up-to-date. For the specialist, the bibliography alone (214 pages) is worth the price of the book, and the integration and ordering of the text by a scientist with a perceptive mind makes this volume invaluable.

RICHARD M. KLEIN

PLANT TAXONOMY. Benson, Lyman. 494 pages, illustrated, indexed. The Ronald Press Co., New York. 1962. $11.50.

This is a guide-book designed for fledgling taxonomists at the undergraduate and early graduate level. The student is given careful instruction about the sources and kinds of data and how to use them in arriving at taxonomic conclusions. There are abundant references to pertinent literature. Liberal use is made of boldface type in order to emphasize important points. Examples are chosen from widely varying groups of plants, although naturally the groups the author knows best are most frequently used. The emphasis throughout is on procedure, rather than on the philosophical foundations of taxonomy. Taxonomic principles per se are covered in a single chapter. There is very little in this book to which the professional taxonomist will take exception, and it will doubtless be useful to those for whom it was designed.

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MANUAL OF VASCULAR PLANTS
(Continued from page 143)

wherever the editorial hand has been laid. Meriting special praise is the addition under many more species of keys to infraspecific taxa—and, unlike the Flora, always in orthodox format.

Cronquist's only real venture into taxonomic revision, heralded in the Preface, reduces *Crataegus* from one hundred and two species to twenty-one, an eyebrow-raising treatment quite as revolutionary as Gleason's collectivized *Rubus* species, which, incidentally and unfortunately, become without explanation unmodified species in the Manual. (This change hardly squares with the prefatorial pledge to maintain Gleason's outlook and surely will lead to a passive evolution of concept without documentation; a sort of taxonomic revision by fiat or perhaps default.) Whether his courageous treatment of *Crataegus* represents a meritorious revision or merely a pragmatic and expedient synopsis, time will tell. Personally, I am mildly disappointed that the *Compositae* remain so nearly intact. One finds much evidence, fortunately, that recent literature was indeed consulted, but this coverage was uneven. Among the many short notes (e.g., "probably a hybrid between . . ."), nomenclatural changes, and added synonyms, we find apparent reference to Schuyler's September, 1961, paper (remarkably recent) under *Scirpus peckii;* yet Swallen's new *Panicum hirstii* (New Jersey) and the new combination *Uvularia caroliniana* (J. F. Gmelin) Wilbur, both published earlier that year in the same journal, *Rhodora,* receive no mention. Moving back two years (1959), we search in vain for reference to Mohlenbrock's new *Cyperus grayioides* (Illinois), published in *Brittonia.* Some taxonomic questions of recent interest are ignored altogether, e.g., the question of the generic status of *Houstonia,* although Sauer is followed in uniting *Acnida* with *Amaranthus.* Regrettably, *Tridens* is still united with the Australian *Triodia* (cf., *Gramineae*).

On balance, the shortcomings are mostly technical, and the Manual has much to commend itself. In answer to "why," I think it should fulfill nicely the latent desire of many for a manual intermediate in difficulty between Gray's and the various popular floras, which nonetheless can still be trusted as both comprehensive and authoritative. The compact size, simple but workable keys, and concise descriptions, divested of non-vital diversionary material, are sure to make it a quick favorite of amateurs and novices. It should be ideal for elementary college and prep school courses in taxonomy, where Gray's Manual has always proved rather too formidable. Professionals will use it widely in routine identification work. These doubtless are precisely the uses and the clientele for which Cronquist enginered the book; therefore, one can overlook the taxonomic shortcomings, which surely he would be first to admit. For taxonomists there is still Gray's Manual, when such a critical and detailed view as Fernald's is required. Furthermore, inasmuch as Fernald's family key is next to impossible even for the sophisticated, everyone will welcome a handy compendium with a *good* family key. (In view of what is certain to be predominantly a lay clientele, one regrets that certain epithets are still capitalized. When and when not to capitalize perennially puzzles lay botanists—and plagues their teachers!) Gleason's Flora should go right on being everybody's favorite picture key, little if any hurt by the new competition.

Cronquist has, through judicious excision, abridgment, permutation, and addition, made a good work in many ways even better and in all respects satisfactory. Not perhaps that radically new type of manual we might have hoped for, but unambiguously useful and very welcome. Van Nostrand must be complimented for an attractive, sturdy production, surprisingly free of error and modestly priced. In consequence, Gleason and Cronquist can be proud of a manual that is likely to become the best-seller of its kind.

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LETTERS TO THE EDITOR

To the birds mentioned by Arthur Ambler in his article in the March-April, 1963, issue, you may wish to add the following as having been observed in the Garden:

Rusty blackbird *(Euphagus carolinus)* near the Rose Garden.

Osprey *(Pandion halietus)* on a dead hemlock over the gorge, September 13, 1958.

Saw-whet owl *(Aegolius acadica)* on a fir outside the Thompson Memorial Rock Garden, November 1, 1962.

Owing Reshes
Bronx, New York

From time to time the rusty blackbird and saw-whet owl have been seen in the Garden. Several hundred different species, in fact, have been seen by bird watchers—the list would have been entirely too long to have included all of them. I selected a representative number and captioned the list "Some of the Birds Observed . . ."

The osprey is seen quite often on the wing over the Garden, but I have never seen one perched within the grounds, and have not met anyone who has. Mr. Reshes was, indeed, quite fortunate.

Arthur W. Ambler
Bronx, New York

A rare bird for the area was sighted at The New York Botanical Garden.

A Swainson's warbler *(Limnothlypis swainsonii),* which rarely goes north of the eastern shore of Maryland, perched on a spicebush *(Lindera benzoin)* in a wild section of the Garden the early morning of May 6, 1963. It was seen by Ed Maguire, amateur ornithologist and for twenty-six years a special patrolman in the Thompson Memorial Rock Garden, and a bird-watching friend, William Hackett. The sighting was verified later that day by Geoffrey Carleton, regional editor of *Audubon Field Notes.*

Swainson's warbler is olive-brown with pale breast, red-brown cap, and dark line near the eyes. It was last seen in the New York City area (in Prospect Park) on May 5, 1950. (Annotated Checklist of New York State Birds, E. A. Reilly & K. C. Parkes).

Phil Clark

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THE NEW YORK BOTANICAL GARDEN

Vol. 13, No. 5 September-October, 1963

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THE GARDEN JOURNAL

DOROTHY EBEL HANSELL
Editor

CALENDAR

September 7 - October 6, 1963. Exhibit of varieties of grapes also their uses as fruit, raisins, and wine, and methods of culture—at The New York Botanical Garden, sponsored by the Garden and Wine Growers of California.

October 1, 1963. Annual Theatre Benefit sponsored by the Volunteer Associates, The New York Botanical Garden: preview of "Here's Love" at the Schubert Theatre.

October 5-12, 1963. Fourth World Orchid Conference, Singapore, sponsored by Royal Horticultural Society, American Orchid Society Inc., and Malayan Orchid Society.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

October 12, 13, 1963. Annual Meeting of American Association of Botanic Gardens and Arboretums, St. Louis, Mo.

October 12, 13, 1963. Bonsai Exhibit at The New York Botanical Garden, sponsored by the Garden and Bonsai Society of Greater New York. Lecture on "The Art of Bonsai" by Yuji Yoshimura in the Lecture Hall, October 12, 3 p.m.

November 7, 8, 1963. Fall meeting of Holly Society of America at Callaway Gardens, Pine Mountain, Ga.

November 8, 1963. Chrysanthemum Show in the Conservatory of The New York Botanical Garden opens.

November 9, 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

December 12, 1963. Holiday House Tour, sponsored by the Volunteer Associates, The New York Botanical Garden.

January 9, 16, 23, and 30, 1964. Lecture Series sponsored by Volunteer Associates, The New York Botanical Garden, in the French Institute Building, 22 East 60th St., New York.

April 22 - 24, 1964. Garden Forum at the Henry Ford Museum, Greenfield Village, Dearborn, Mich.

April 29, 1964. Members' Garden Party.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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Front cover illustration—chrysanthemums at The New York Botanical Garden, photographed by Walter Singer; pp. 162-164, Quattlebaum Studio, Aiken, S.C.; p. 165, Arnold Arboretum, Jamaica Plain, Mass.; pp. 167, 168, Saratoga Horticultural Foundation, Saratoga, Cal.; pp. 169, 170, Robert K. Zuck; pp. 171-173, The Lawn Institute, Marysville, O.; Callaway Gardens, Pine Mountain, Ga.; pp. 179-181, Alice Dustan Kollar; p. 182, Walter Singer; pp. 186-189, Phil Clark; p. 191, upper, Wine Growers of California, lower, Bonsai Society of Greater New York; pp. 195, 196, Walter Singer.

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The small, creamy white flowers of *Eriobotrya japonica* or loquat have a woolly aspect. They form an interesting pyramidal cluster.

FRAGRANCE FROM FALL FLOWERS

By JUNE RAINSFORD HENDERSON

Mrs. (Peronneau Finley) Henderson writes about the plants she grows in her garden, "Floralia," in Aiken, South Carolina. Her achievements as horticulturist, author, and lecturer have been recognized by The Garden Club of America and The Garden Club of South Carolina. Recently, Dr. G. H. M. Lawrence, Director of the Rachel McMasters Miller Hunt Library, presented Mrs. Henderson a copy of *A Catalogue of Redoutéana Exhibited at the Hunt Botanical Library 21 April- 1 August 1963* in appreciation of her article on Redouté in a recent issue of *The Bulletin of The Garden Club of America.*

FRAGRANCE FROM CERTAIN FLOWERS has the powerful quality of transporting one from existing surroundings and circumstances to those of former places and experiences. At this time of year, autumn, fragrances seem more distinctive; some of the plants have a delightful pungency which is clearly defined in the cooling atmosphere.

I can crush a rose-geranium leaf in my hand, whiff it, close my eyes, and I am instantly carried back twenty years to a frosty October morning spent at the Weathered Oak Herb Farm, which was located in Maryland just over the District line from Washington. In my eyes of memory I can see row upon row of aromatic herbs. I think all were there, the mints, thyme, lavendar, rosemary, marjoram, bergamot, all the varieties of basil, dill, and many of the sweet-leaved geraniums. There was wonderful contrast in the shades of green and in the formation of the foliage. There were flowers and seed pods. Each plant gave off its own odor, but I remember a perfect blending of all the different odors, the atmosphere being filled with an intoxicating fragrance. Some of the aroma came from the armful of cut herbs given to me on my arrival at the Farm. Perhaps the light frost, which had formed the night before, was responsible for releasing the delicious scents.

The memory of that experience is exhilarating, one I am glad I can so vividly recall by bruising a sweet-leaved geranium in my hand. I can appreciate what Gerard meant when he wrote, "If odours may worke satisfaction, they are so soveraigne in plants and so comfortable that no confection of the apothecaries can equal their excellent virtue."

Another experience is recaptured whenever I catch the sweet odor of the flowers of elaeagnus. That was an afternoon in Colonial Williamsburg. The time was also October, and the damp, warm air was heavy with the fragrance of this shrub. Perhaps the stillness of the atmosphere kept the penetrating sweetness from being dissipated. Although elaeagnus is floriferous, the white, bell-like blossoms are inconspicuous and often obscured by the luxuriant foliage.

Other qualities besides fragrance make elaeagnus a useful and ornamental garden shrub. There are a number of species—a few are deciduous, most are evergreen. The deciduous species are hardy in the North, but the evergreen thrive only in the South. A very attractive characteristic of some species is the silver under surface of the green leaves. *E. pungens* has a silvery hue, dotted with brown scales, to the under side of its leaves, and this creates a very interesting effect. The flowers of *E. pungens* are said to be exceptionally fragrant. *E. fruitlandii,* which has been developed in recent years, differs from some of the other members of the genus in that the upper side of the leaves is gray-green rather than deep green, and the fully developed fruits are light pink in color rather than deep red.

Elaeagnus has also the good quality of being easy to cultivate. If provided with good drainage and a sunny location, its growth is apt to be so vigorous that frequent pruning is necessary to keep the shrub within bounds. Elaeagnus is most satisfactory to mark the outer boundary lines of a property and, when used as a hedge, should not be planted too closely. The more the shrub is pruned, the thicker it becomes until a hedge of elaeagnus is impenetrable. And the plus value of this practical planting is that of redolence during the fall season.

In contrast to elaeagnus in leaf formation, habitat of

The leaves of *Elaeagnus fruitlandii* are gray-green, the under surface silvery.

growth, and bloom is the loquat, *Eriobotrya japonica,* but it has a similar quality in that its fall flowers are fragrant. This evergreen tree, which originated in Oriental countries, has become widely cultivated in subtropical areas. In this country it thrives abundantly in Florida and the Gulf States and also grows farther north where winters are fairly mild.

In Charleston, South Carolina, *E. japonica* grows to perfection; here it attains a height of twenty-five feet or more. The coarse, heavy green leaves, sometimes ten inches long and somewhat indented, grow very densely, making a striking ornamental shrub in any garden planting. Early in the fall the lovely fragrant blooms appear and fill the surrounding area with a haunting sweetness. These small, white flowers, with a woolly aspect, make a pyramidal cluster. The fruit begins to form as soon as the petals wilt, develops during the winter, and ripens in the spring. This characteristic is contrary to that of most fruit-bearing trees, and is very interesting. There is quite a little variation in the color of the fruit as well as in the color of its flesh. The thin, smooth skin varies from yellow through deep orange to reds, while the flesh of the fruit ranges from white to deep red. Because of its acid flavor, the fruit is very acceptable for jams and marmalades.

In California and Florida, where winters are consistently warm, orchards of loquat are planted, and the fruit has market value, but in cooler regions this native of the Orient is treated as an exotic specimen. Because of the unusual texture and size of the leaves, *E. japonica* furnishes excellent contrast to most of our native evergreens.

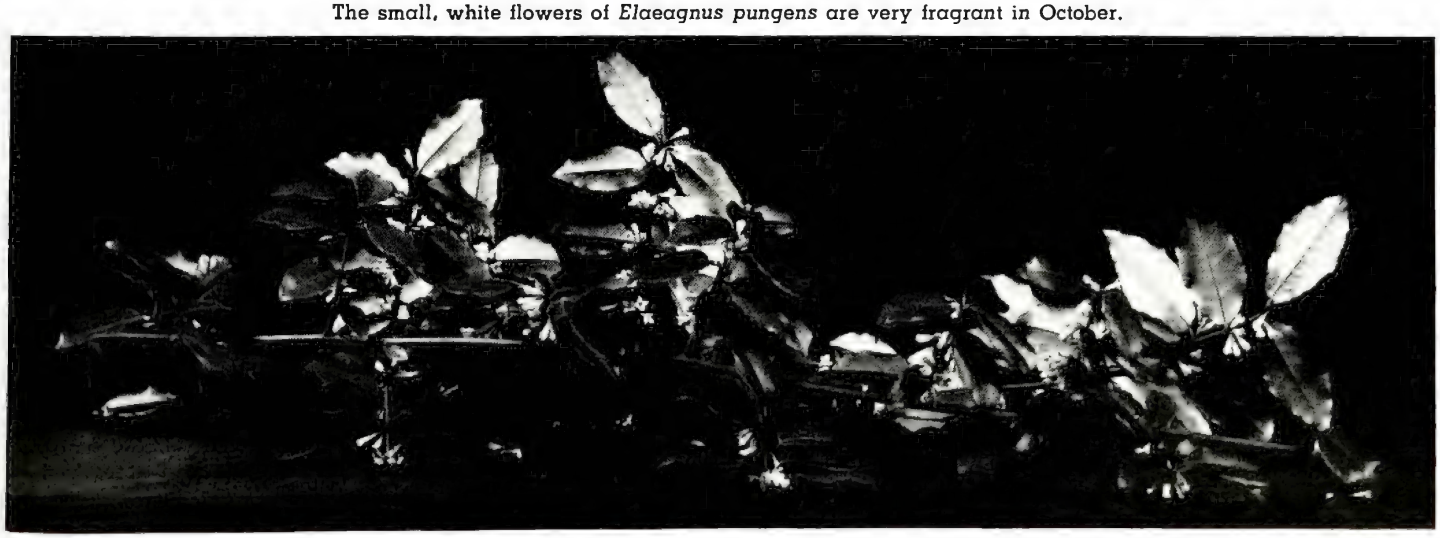
The favorite fragrance pervading southern gardens during the autumn comes from the several members of the genus *Osmanthus.* The best loved, and the one that has the sweetest scent, is *O. fragrans,* generally known as tea-olive. This species differs from some of the others in that it blooms from early spring off and on through the summer until October and November, when it has another blooming period—and it blooms even later if warm weather holds. *O. fragrans* is not very cold-hardy and is badly injured even in the southern states in very severe winters. *O. (aquifolium) ilicifolius* can take the cold without injury as far north as southern New England. The foliage resembles that of the English holly *(Ilex aquifolium);* the white flowers appear in late fall.

One of the most satisfactory members of the genus is *O. fortunei* which, according to Bailey, is probably a hybrid of *O. ilicifolius* and *O. fragrans.* The rather large leaves are a rich dark green and the spines are well defined. This beautiful shrub would be of ornamental value, even if it never produced any flowers. The very white flowers appear all at one time, which is in October in the mid-South. They are not as fragrant as those of *O. fragrans,* but they come in great profusion and present a beautiful over-all effect.

Osmanthus ilicifolius 'Mouillef' strongly resembles *O. fortunei,* but differs in that its leaves are rounded and without spines. It grows to a great size and is magnificent when almost fully covered with its pure white flowers.

There is a great variation in foliage as well as in flower in the osmanthus group. A fairly recent introduction is *O.* 'Gulf Tide', whose foliage resembles that of *O. ilicifolius* but seems to grow more compactly. *O. aquipurpureus* has a very small, spined leaf. Its new growth is at first purple, and as it develops, it retains a purple tinge. *O. rotundifolius*

The small, white flowers of *Elaeagnus pungens* are very fragrant in October.



Cuttings of six species of *Osmanthus*. From left to right. *O. fragrans, O. fortunei, O. armatus* 'Diels', *O. ilicifolius, O.* 'Gulf Tide', and *O. ilicifolius purpureus.*

is a handsome plant, and its leaves are round and almost spineless. Sir Herbert Maxwell in his *Garden Note-Book* says that *O. delavayi* is one of the real prizes that have come from China. It is apparently more satisfactory than *O. sauvis,* which seems to be a slow grower. *O. armatus* 'Diels' has a very large leaf, sometimes as much as five or six inches in length, and produces a profusion of bright yellow flowers in October. Two splendid specimens of this osmanthus, one on each side of the wrought-iron entrance gate, grow in the ancient and beautiful Hampton-Preston Garden in Columbia, South Carolina. These plants are probably approaching the century mark in age, as the garden in which they are growing was planted before the "War between the States."

Perhaps the most exciting fall-blooming osmanthus is *O. aurantiacus.* Its leaves are also large, and its flowers a deep pinkish yellow, in fact, they look almost orange in color. The difficulty in cultivating this species must account for its rarity.

SORBUS
for American Gardens and Community Landscapes

By SHIU-YING HU

Dr. Hu is a botanist at the Arnold Arboretum of Harvard University, Cambridge, Massachusetts.

CHANGES HAVE TAKEN PLACE in American gardens and landscapes. The split-level and ranch-type houses of the expanding suburban communities have created an urgent need for medium-sized, decorative trees to complement the straight lines of the low, spreading constructions. Progressive gardeners and horticulturists, community planners and landscape designers alike are re-evaluating the suitability of the more familiar material and searching for additional forms for use in private gardens and community landscapes. The species of *Sorbus,* of low or medium stature, symmetrical shape, graceful foliage, fragrant white flowers, and large clusters of fruits, varying from scarlet to pure white, are well qualified to meet this need. In a private garden or in a community landscape sorbus adds color, warmth, and distinction; and it is attractive to birds. These salient facts must have been observed by many visitors to the Pacific Northwest, for in large cities, such as Seattle, Washington, and Portland, Oregon, sorbus is used a great deal more than here in the East. There sorbus is planted along city avenues as well as in private gardens.

Both native and introduced species of *Sorbus* are cultivated in American gardens and arboretums. These can be divided into three major groups represented by the mountain-ash, the service-tree, and the white beam-tree.

THE MOUNTAIN-ASHES

The mountain-ash type of *Sorbus* is by far the most widely distributed. Species of this group have pinnate-compound leaves; small, cream-white flowers arranged in large, flat clusters, measuring four to five inches across; and conspicuous clusters of apple-shaped fruits, measuring one-fourth to one-half inch in diameter. The fruits, scarlet, coral-red, cream-white, or snow-white, are eaten by birds.

American gardeners and landscape designers have a wealth of suitable mountain-ashes from which to choose for their special requirements. Almost every major mountain range of the Northern Hemisphere has one or more species characteristic of that range. In eastern North America, the American mountain-ash *(S. americana)* and the showy mountain-ash *(S. decora)* grow spontaneously from the Appalachians northward to southern Greenland. In western North America the cliff mountain-ash *(S. scopulina)* grows in the Rocky Mountains; the Cascade mountain-ash *(S. cascadensis)* in the Olympic and the Cascade Mountains and in the mountains of northern California; the California mountain-ash *(S. californica)* in the Sierra Nevada Mountains; and the

The American mountain-ash, *Sorbus americana*, is found from the Appalachians northward to southern Greenland.

Sitka Island mountain-ash *(S. sitchensis)* in the mountains of Alaska, Yukon, British Columbia, Washington, Montana, and Idaho. The southernmost species in the New World, the bushy mountain-ash *(S. dumosa)*, occurs in the subalpine regions of Arizona and New Mexico.

Some of the American mountain-ashes have been under cultivation for generations, but many of them are still waiting for an opportunity to play their part in beautifying the more populated sections of their homeland.

The showy mountain-ash *(S. decora)* is one of the more desirable native mountain-ashes for ornamental purposes. Its fruits are larger and more conspicuous, ripen in August and September, and persist into the winter. In the autumn, it is very attractive because of its conspicuous yellowish leaves and red fruits. It flowers in May and June. *S. decora* thrives in poorer soils and colder climates; its closely related species, the American mountain-ash, loves rich moist soil.

The European mountain-ash *(S. aucuparia)* occurs in the mountains of Europe, western Asia, and thence eastward to western Siberia where its range overlaps that of the Tien-shan mountain-ash *(S. tienshanica)* of central Asia and western China. *S. aucuparia* is more frequently planted in America than the native species. It is naturalized and well established in many areas from Labrador to Pennsylvania and westward to North Dakota, Washington, and British Columbia.

In Europe the mountain-ash is better known as the rowan tree, roan tree, quicken tree, and witchen tree. There it is widely grown, especially in churchyards, because it was looked upon as a sacred tree and was credited with having furnished the wood of the Cross. It has been woven into the fabric of the life of the people—there are many superstitions and legends about it. In the Highlands of Scotland, the people considered the rowan a completely effective antidote against the effects of witchcraft and the "Evil Eye." They commonly carried a twig of the rowan in their pockets. To insure full efficacy, the twig was accompanied by one of the following couplets written on paper, which was wrapped around the wood and secured by a red silk thread: "Rowan Ash and red thread, Keep the devils frae their speed"; or "Roan-tree and red thread, Haud the witches a' in dread." The Scottish farmers used to place branches of the rowan and honeysuckle in their cowhouse every May second to protect the cattle against witchcraft. The dairymaids of Lancashire preferred a churnstaff of rowan-wood to that of any other tree, for they believed it to be effective in preserving the butter from evil influences.

In Wales, when a corpse is taken to the churchyard, it is first rested under a rowan tree which is considered sacred. In Aryan tradition, the rowan is taken to be an embodiment of lightning; it is also thought to possess magical powers of discovering hidden treasure.

A Gaelic legend states that in the days of the Fenians there grew in Ireland a celebrated rowan called the quicken-tree of Dubhros. It bore wonderful fruits which contained the exhilaration of wine and the satisfaction of old mead. "Whoever shall eat three of these fruits, though he be of the age of a hundred years, he shall return to the age of thirty." This tree and its fruits were jealously guarded by a hideous-looking giant, Searbhan Lochlannach. He was slain by Diarmuid O'Duibhne who was incited by his wife, Grainne, to obtain the fruits for her.

In many parts of England, before the days of modern veterinary medicine, the death of domestic animals was thought to be caused by bewitchment. It was customary to take out the heart of one of the victims and burn it to a cinder over a fire from the wood of a rowan tree.

The mountains of central and western China constitute the center of distribution of the species of *Sorbus*. There variations in the size of the plant, type of foliage, and color of fruit reach a peak of differentiation. Species with shrubby habit, graceful mimosa-like leaves, and snow-white fruits and others with arboreal habit, ashlike leaves, and brown, pink, or red fruits are found within distances of five miles. Most of the Asiatic mountain-ashes have been introduced into American gardens. So far as I know, the University of Washington Arboretum in Seattle has the best living collection.

One of the most attractive Asiatic species is the white-fruited snowberry mountain-ash *(S. discolor)*. It is hardy

(Continued on page 190)

The showy mountain ash, *Sorbus decora*, is one of the desirable native species for ornamental purposes.

CEANOTHUS - AN APPRECIATION

By MARJORIE G. SCHMIDT

Mrs. (Willard E.) Schmidt of Los Gatos, California, an avid gardener for most of her adult life, has been especially interested in growing native plants for the past fifteen years. She was formerly a member of several garden clubs, but has forsaken them to devote more of her time to the serious study of native plants. Mrs. Schmidt is a member of the California Horticultural Society, the California Academy of Sciences, and the Garden Writers' Association of America.

MEMBERS OF THE GENUS *Ceanothus* are evergreen shrubs encompassing a wide range of plant size, many bearing prolific quantities of flowers in shades of blue. Forty-four species grow in mountains, foothills, valleys, and coastal regions of the Pacific States. Some thirty species are indigenous to California where the greatest evolutionary development has taken place. The majority of *Ceanothus* species are of a characteristic size and shape, being shrubs of medium height, up to ten feet, dense and compact, often wider than tall. Some deviate from this norm, one being a tree of twenty-five feet; several are very large, slender shrubs which approach tree size; and the remainder are low plants, two feet or under with prostrate or carpeting tendencies. Those who know only the eastern *Ceanothus americanus,* New Jersey tea, have little concept of the many species that are an important part of the western wild landscape. They are integral constituents of thick chaparral, they mingle with woodland plants at many elevations, and some drape ocean bluffs. Horticulturists have discovered within the genus a quality of pliability from which have come variations in flower color, leaf form, and plant size through selected seedlings and hybrids. Gardens all over the world have been enriched by these as well as adaptable species.

Those who write of ceanothus in a formal vein seldom emphasize certain engaging qualities important to all who enjoy intimate association with plants. In my estimation, ceanothus can provide more dividends than just the passing show of flowers. Flower-buds in that period just before bursting are bits of intricate design, some delicate, others more highly colored. While the several types of inflorescence are faithfully described in botany books, the descriptions hardly excite the imagination or do justice to the living plant. And the many shapes, sizes, and textures of foliage, along with unusual seed-vessels, merit intimate scrutiny.

A brief sampling of species from different altitudes and topographical regions will serve to show variations within the genus. To one familiar with the extent of its distribution, it is difficult to reduce *Ceanothus* to a few representative species. In attempting this glimpse, I shall start in the mountains where the thorny, stiffish *C. cordulatus,* snowbush, grows on rocky ridges and at forest edges. *C. velutinus,* tobacco-brush, grows in hedgelike concentration in many areas of the Pacific Northwest mountains. On slopes and steep road cuts *C. prostratus,* known as squaw carpet or mahala mat, spreads flat, leafy branches. Often these dark green mats hump over rocks and stumps, flowing over the ground and any obstacle in their path. *C. integerrimus,* deer-bush, is a widely distributed species, growing at several elevations, and bearing flowers in several colors. Prolific flower-trusses in white, powder-blue, or a pinkish color give a glorious display in woods or open areas of forests in mid- to late spring, which is well worth seeing.

It is through the miles of foothills in California that the greatest concentration of species occurs. *Ceanothus cuneatus,* back-brush, or wedge-leaf ceanothus, is a ubiquitous species of both chaparral and wooded foothill. Myriads of small, white flower-clusters begin to open in February, perfuming the air and bringing bees to tumble through the blossoms. Santa Barabara County claims twenty species of *Ceanothus,* drought-tolerant shrubs which clothe the rugged, often arid mountain slopes. Prominent among these is *C. divaricatus* with white bark and bright blue flowers; *C. spinosus,* a large shrub or small tree bearing white or pale blue flowers; and *C. megacarpus,* big-pod, whose abundant clusters of white flowers in February whiten the mountains. Perhaps the most popular is *C. impressus,* known as Santa Barbara ceanothus, and once listed as one of the ten best shrubs of California.

The first ceanothus to be recognized, named, and exported to other countries was *C. thyrsiflorus,* blue-blossom. Native to coastal regions from Santa Barbara to Oregon, it is especially abundant in the redwood belt. Fluffy, compound flower-spikes in various shades of blue are borne in profusion, creating the illusion of great gardens in open forest spaces. Its form, *C. thyrsiflorus repens,* with long, arching branches and steel-blue flowers, hangs curtain-like down ocean bluffs. *C. papillosus* frequently grows in the same regions, its rough-textured, black-green foliage contrasting with the bright green, oval leaves of blue-blossom. It is difficult to use restraint when it comes to describing *C. incanus,* coast whitethorn. Its white bark, soft green leaves, and quantities of solid, cream-white flower-spikes make it an elegant, garden-like shrub. In the region of Carmel, *C. griseus* scampers over sandy slopes and sea bluffs. The many garden types that have come from this species is out of proportion to its restricted distribution. One of the most adaptable, it has become increasingly popular for gardens and large-scale landscaping. *C. gloriosus,* Point Reyes creeper, with toothed, rich green foliage, is used extensively in gardens, although wild only in a narrow coastal area. Another type of the central coast ranges is *C. foliosus,* wavy-leaf ceanothus, a low, spreading form with handsome foliage and bright blue flowers.

Two species of San Diego County are useful garden subjects, each having distinctive ornamental qualities. *C. verrucosus,* warty-stem ceanothus, native to a small area of the coast, has deep green, glossy foliage, and airy, white flower-clusters. *C. cyaneus,* San Diego ceanothus, is native to a few isolated stands in the mountains; it is an erect shrub with spectacular violet-blue flower-panicles. Its discovery and introduction to cultivation are a dramatic story, similar to many in which wide-awake horticulturists have aided in the rescue

of rare species. With reluctance I conclude this "hop and skip" around the West with *C. arboreus,* Catalina ceanothus. Native to the coastal islands, this is the only one of tree proportions, lovely when the abundant clusters of lavender-blue flowers are in bloom.

A close inspection of types of inflorescence reveals interesting details generally unrecorded. These inseparable factors will be described together. Ceanothus flowers vary little among the species, small individually, but showy because of their abundance. The flower parts are generally of the same color and include long-clawed petals, expanded at the tips, sepals which fold in over the central disk, exserted stamens, and a three-cleft style. The flowers occur in small clusters, disposed along the branches or at branch tips. The resulting inflorescence is a raceme or panicle, appearing different only because of spacing—airy in some, solid in others, and gradations of each. The flower color was once simply described as white, blue, purple, or pink. Now color terminology has been extended with familiar qualifying words to describe the vibrant shades of blue. Thus the terms azurite, flax, blue-bird, sea, powder, violet- and cobalt-blue have come into modern use. White includes pure white and cream-white or ivory. Outstanding are the open clusters of lacey, white flowers of *C. verrucosus.* The deepest color occurs on *C. purpureus* which has round, stalkless clusters of very dark blue to purple flowers.

Each spring, when I can hardly wait for flowers to appear, I begin inspecting *Ceanothus* 'Mills Glory' for expanding flower-buds. A versatile garden hybrid, it is a four-foot spreading shrub with glossy, dark green, toothed foliage. The miniature perfection of these flower-buds defies doing justice to them in mere words. In January they become conspicuous, tiny, gray-green dots, gradually expanding into spheres of a precise design of unopened flowers and silky scales. Finally, in late February, they burst into bloom, becoming round, stalkless clusters of intense violet-blue flowers. They appear to be mathematically spaced on the leafy branches, an ultimate artistry deserving of this rapt attention. Under a magnifying glass the unopened flower-buds of *C. griseus* appear to be tight clusters of tiny, navy-blue grapes, surrounded by pale lavender, silky scales. On *C. incanus* early flower-buds are a spire of greenish white, becoming solid, rich cream-white, cylindric clusters as they burst into bloom. *Ceanothus* 'Julia Phelps', a free-flowering plant of excellent performance, enjoyed instant popularity. Swelling flower-buds in early February are a colorful rose-beige, from which bits of the deep blue flowers begin to show in March. These buds open into densely flowered, glo-

Ceanothus griseus horizontalis growing on Yankee Point, Carmel Highlands. The cultivar *C. griseus horizontalis* 'Yankee Point', introduced by Saratoga Horticultural Foundation, was collected here.

Above. Close-up of the cultivar 'Yankee Point'.

Left, *Ceanothus* × 'Ray Hartman' in full bloom the end of March and right, close-up of the flowers.

bose panicles of cobalt-blue, a stunning sight against the dark rugose foliage. A departure in type of inflorescence occurs in *C. ramulosus* var. *fasciculatis*. Quantities of small, round clusters of delicate lavender flowers cover outflung and pendent branches in a spiraea-like effect. The plants are literally smothered in blooms, almost hiding the small, wedge-shaped leaves. If to these are added the colors, both subtle and brilliant, of European hybrids, the range is extended considerably. Many of these are well suited to the eastern states and include several pink and rose shades, which the western species do not as yet provide.

Foliage in ceanothus, as with any evergreen shrub, is an important year-round feature. Variations in form are not great, and in the majority of species the leaves tend to be ovate, of varying widths and lengths. If, however, we could have at hand leaves of even a few representative species, impressive deviations would be apparent. Examples of extremes of foliage would be *C. arboreus,* whose three-inch-wide, ovate, slate-green leaves are of thin texture; at the opposite end would be the quarter-inch-wide, blunt, oblong, leathery leaves of *C. cuneatus*. The leaves of all but two species are evergreen. More noticeable than size and form is the surface texture which, in many cases, is lustrous and imparts a rich green to the plants.

Ceanothus foliage falls into several types, based on a whimsical feminine eyeview rather than in strict accordance with botany. The oblong-ovate, three-nerved, bright green leaves of *C. thyrisiflorus* is common also to *C. griseus, C. sorediatus,* and the lovely hybrid, *C.* 'Sierra Blue'. Within the ramifications of *C. griseus* there is some variation. The five-foot, spreading *Ceanothus* 'Louis Edmunds' is well clothed with two-inch, oval, deep green leaves. In the selected form *C. griseus* var. *horizontalis* 'Yankee Point', round leaves are closely set on creeping branches, forming a solid, enduring groundcover.

A second type includes several species and many hybrids which have wrinkled, rough, or papillate foliage. *C. papillosus* is a prime example, having elliptic, two-inch, very dark green leaves with wart-like protuberances. *C. roweanus, C. impressus* and *Ceanothus* 'Julia Phelps' have similar wrinkled foliage, often looking like deep pile brocade.

In a third category the leaves are holly-like, generally small with undulate and spine-tipped margins. The substance is thick, often leathery, with a waxen surface, not always shiny, but reflecting light nonetheless. Prominent in this group are *C. purpureus, C. jepsonii,* and *C. gloriosus* and its variations. Dear to me is a rare type related to *C. gloriosus,* known as *C. porrectus*. Smaller in every way, the tiny, toothed, dark green leaves are only a quarter of an inch long. On low, arching branches February flower-buds are small editions of those of *Ceanothus* 'Mills Glory', opening into dainty clusters of chalk-blue flowers.

Many species and hybrids of *Ceanothus* could be included in a miscellaneous category of leaf types. *C. dentatus* has a distinctive leaf, elliptic, somewhat revolute on the margins, squared-off at the apex, and of several lengths on the same plant. Aside from its lacey, white flower-clusters, *C. verrucosus* is highly recommended as a foliage plant, since its heart-shaped, deep green leaves remain in good form throughout the year. A lovely hybrid of tree size is *Ceanothus* × 'Ray Hartman', with glossy, deep green leaves, prominently veined, setting off the huge panicles of bluebird-blue flowers.

The fruit of ceanothus is a three-celled subglobose capsule enclosing tiny, oblong seeds. Differences in these fruits are minor, noted by the observant as slight variations in the outer covering, or by crests or horns occurring in some. Capsules are small and may be triangular, merely globular, or conspicuously three-lobed. Deer-bush has upright clusters of light brown, sticky, triangular fruits which chipmunks gobble eagerly. Capsules of *C. griseus* are attractive for their jet-black color. Some correlation of horned capsules with holly foliage has been noted by botanists. Of great interest to me is the discovery that a coast range form of *C. prostratus* bears capsules with wrinkled dorsal horns in russet-red. *C. impressus* sets thick clusters of mahogany fruits which have prominent lateral crests. Perhaps the most showy capsule is that of *C. megacarpus,* whose name means large seed pod. Dorsal horns decorate the large, globose fruits which become a reddish brown during the ripening process.

Fragrance is a supreme feature in some ceanothus, an added attraction in this genus already replete with interesting traits. Flower fragrance occurs in many species with varying

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THE GREAT SWAMP OF NEW JERSEY

By ROBERT K. ZUCK

Dr. Zuck has been a member of the faculty of Drew University since 1946 when he joined it as Assistant Professor of Botany. He is now Professor and Chairman of the Department of Botany. He served as Director of In-Service Institute in Basic Botany for high school teachers, held at Drew University and sponsored by National Science Foundation, February-June, 1963, and participated in the Summer, 1963, Conference on Marine Biology and Tropical Ecology, held at the University of Puerto Rico and also sponsored by National Science Foundation.

FOR THOSE OF US who live near the Great Swamp, the name does not have quite the connotation it might have for those who see or hear the name for the first time. We who are familiar with the area know it as a fascinating place of greatly varied habitats, although dominated, to be sure, by large wet spaces. There are two distinct histories relevant to the Great Swamp, namely human and natural. Since something of the history of an area helps one's appreciation of the present, a bit of the past should be apropos.

NATURAL HISTORY

Given ample time the Great Swamp, like most swamps, would eventually disappear. This is especially true in this case, because the Great Swamp is a remnant of a glacial body of water known as Lake Passaic, which once covered three hundred square miles of northern New Jersey. As the glacier (of Wisconsin age) melted and retreated, the drainage pattern changed, and what was once an extensive body of water of considerable depth became isolated ponds and wet places. The Great Swamp occupies the southwestern end of what was Lake Passaic and covers about seven thousand acres. Four streams drain the area, all of which became part of the Passaic River. Thus by continued drainage and the filling up of low areas by accumulating vegetational remains, there would eventually be no swamp, say in another five thousand years.

HUMAN HISTORY

New Jersey will be celebrating its tercentennial in 1964. Settlement first occurred near the coast and along streams. About one hundred years after the first coastal settlements, the rather low Orange and Watchung Mountains were crossed, and new lands were opened up to agriculture. Thus by mid-eighteenth century the first permanent settlements began to appear. Where the pleasant residential town of Madison is now, there were once a tavern and a few simple houses, the collection known as Bottle Hill. The shore-line of extinct Lake Passaic was settled first; toward the end of the eighteenth century the less desirable land in the Great Swamp was occupied, and that only here and there, where a few feet of elevation assured reasonably dry terrain for crops. Sporadic lumbering has occurred from the first and continues to the present.

THE PRESENT CONCERN

Why save a swamp? Why the Great Swamp? The answer has some of the maddening exclusiveness attributed to miracles: for those who have faith no explanation is necessary; for those who have no faith no explanation is possible. For those of us who know the Great Swamp it is unthinkable that it should succumb to buildings and roads, or a jet port. Primitive wilderness is becoming rarer in the populous eastern States. The disappearance of the Great Swamp would be catastrophic. For those who lump swamps, mosquitoes, and snakes together, the need for saving the swamp seems obscure indeed.

Unlike miracles, however, the Swamp and its more alluring aspects can be presented at will. All can see for themselves, not a select few with a mysterious inner vision. Let us make a small journey into the Great Swamp, one primarily botanical in its purpose, and even the skeptical will begin to see its attraction.

Spring appears early in the Swamp, with the skunk cabbage (*Symplocarpus foetidus,* malodoriferous cousin of the jack-in-the-pulpit) pushing its inflorescenses through the

Laurel, *Kalmia latifolia,* blooming in June in the Great Swamp, shows the predominantly white flower. Right, close-up of the white-flowered form of *K. latifolia.*

Cinnamon fern, *Osmunda cinnamomea,* grows along the broad walk in a section of the Great Swamp belonging to the Morris County Park Commission.

cold ground, with help from heat generated by its own metabolism. Pale fertile branches of the horsetail, *Equisetum arvense,* come early, too, with the green, food-making branches not fully grown until June. The more aquatic *E. fluviatile* first appears as a slim, green rod, with conspicuous nodes and internodes; then by mid-June, its branching appears and it is more noticeable.

Many different kinds of algae begin growth early in the season. The clear waters abound with desmids, *Mougeotia, Spirogyra, Rivularia,* and many other green and blue-green algae. These are the food makers for most of the aquatic animal life. The changing populations of algae over the advancing seasons reflect changes in water temperature, acidity, and available nutrients. The seasonal changes in populations of microscopic aquatic plant life are as pronounced as those amongst the flowering plants.

Ferns abound, and the classic beauty of unrolling fronds of *Osmunda cinnamomea* and *O. claytoniana* never fail in expressing the spirit of spring and growth. The royal fern, *O. regalis,* so different from the other species, appears with a coppery new growth, and until its fertile portions are produced, the relationship of it to the cinnamon and interrupted ferns will not be apparent.

The red maples *(Acer rubrum),* which abound in the wet places, are a blaze of orange and red with new growth and early blooms in April. Oaks are common, and often dominant on higher ground. The pin oak is perhaps the most common of the oaks, but chestnut oak, black oak, and red oak are to be found. Majestic swamp white oaks are impressive specimens here and there in less disturbed areas. Sweet gum and sour gum are easily found, with some young stands of the former quite abundant.

One of the glories of the Great Swamp is the magnificent display of laurel *(Kalmia latifolia)* in the area set aside by the Morris County Park Commission. Here are acres of bloom in early June. This stand of laurel is dominated by plants producing almost pure white blooms. Even those in full sunlight are white. It would be interesting to try some younger plants in other habitats to see if the white coloration is genetic or environmental, or both.

Among the aquatic flowering plants are the bladderworts,

The marsh-marigold, *Caltha palustris,* blooms freely in April in the Great Swamp.

those plants usually noticed only when in bloom, with yellow blossoms on delicate stems rising directly out of the water, with no visible support. These utricularias have the most elaborate animal-trapping mechanisms of any plant, and by the thousands, on their submerged foliage. A mosquito larva, perhaps attracted chemically to the opening of the little bladder, will swim in and, touching sensitive hairs, stimulate the bladder to close the opening and trap the animal inside, where it will die and be digested. If the larva is not completely in, the bladder will recock the mechanism that opens the "lips" and will try another "swallow." This will be repeated several times until the animal is all inside. Although the plant blooms in June, the bladders are active throughout the year. Sun dews, *Drosera* spp., are to be found, too. But these inhabit the mud near the water. They capture prey with the sticky hairs on their leaves.

Sedges, rushes, and grasses cover vast areas, and many different species are represented. One grass, *Andropogon virginicus* var. *abbreviatus,* is especially handsome in autumn

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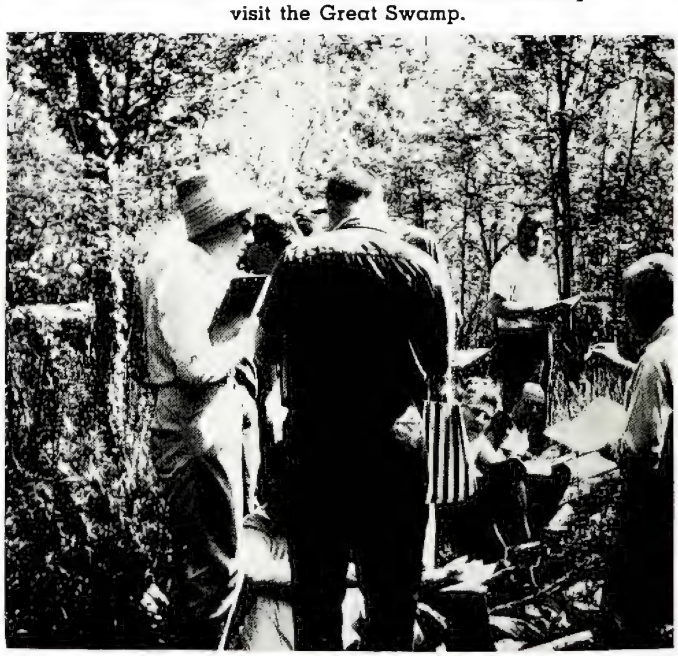
Dr. Benjamin Blackburn, Adjunct Professor of Botany, Drew University, and a group of the high school teachers, who attended the In-Service Institute in Basic Botany sponsored by the National Science Foundation and held at Drew University, visit the Great Swamp.



THE CURIOUS CASE OF HIGHLAND BENTGRASS

By ROBERT W. SCHERY

Dr. Schery is Director of The Lawn Institute, Marysville, Ohio. He is author of *The Lawn Book* (The Macmillan Co., New York, 1961).

THE TITLE MAY SOUND LIKE Sherlock Holmes or Perry Mason, but the inspiration came from *The Garden Journal* itself. In reading Dennison Morey's interesting evaluation of the relative superficiality of rose breeding (Vol. 13, No. 3, May-June, 1963), a comparison with quality lawn grasses was inevitable.

The best lawn grasses from seed are the well-known Kentuckey bluegrasses *(Poa pratensis),* the fine or red fescues *(Festuca rubra),* improved cultivars of which are grown in Oregon, and the bentgrasses (*Agrostis,* in various species). Kentucky bluegrass and fine fescues are the main ingredients of quality lawn seed mixtures for the northern two-thirds of the nation, while the bentgrasses are mostly used alone for speciality turfs which can receive the sort of care that bentgrass merits.

The genetic situation is peculiar to each species, and not a little confusing. Kentucky bluegrass, almost surely an adventive from Europe, seems a thoroughly mixed-up polyploid which has for the most part adopted apomictic (non-sexual) reproduction by seed. Nature has so stirred bluegrass heredity that man can scarcely improve upon the brew, even were he inclined to take the trouble to meddle with crossing a predominately apomictic species. A plethora of Kentucky bluegrass cultivars are on the scene, simply selected out of wild or natural Kentucky bluegrass populations and perpetuated by rouging a largely true-breeding (because of apomixis) population. Outstanding cultivars can be found, for a particular trait, an especial climate, and so forth, but few selections match the versatility and wide adaptability of the parent natural Kentucky bluegrass, a hereditary mélange with all the flexibility that this implies.

Fescues are not so obligingly apomictic, but here, too, selection and isolation have been the chief techniques for uncovering new cultivars. On occasion "inbreds" are combined in the planting field, both with fescue and with certain bentgrasses, to yield "polycross" seed. To the best of my knowledge, controlled sexual crossing has not yielded any very unusual or useful cultivars, although it is something of a triumph that Dr. Buckner, at the University of Kentucky, was able to achieve a cross so wide as between ryegrass *(Lolium)* and tall fescue *(Festuca arundinacea).*

All in all, it seems as though with the better turf grasses, unlike with roses, there have been no outstanding results from formal breeding programs which demand the crossing of different botanical, or even horticultural, varieties. Selection from what nature has supplied does just about as well (there is plenty of ploidy and genetic intermixture already). Moreover, the economic use of a good turf grass demands not a distinctive shape or shade of flower, but only a persistent groundcover of green, albeit of attractive, fine texture. Subtleties are thus not so important in a turf grass cultivar as in a rose or other ornamental. Just so the basic essentials of persistence, adaptiveness to mowing, and low-spreading growth exist, how the lawn grass is treated (fertilized, mowed, weeded, watered) makes more difference than hereditary subtleties. For such fundamental desiderata, natural selection seems already to have accomplished more than planned breeding. The few broadly based attempts at sexual crossing, such as the extensive series of matings between bluegrass species and ecotypes with Jens Clausen's Carnegie Hybrids, have almost invariably yielded inferior rather than superior variants for clothing suburbia's luxurious swards.

As an example of this state of affairs in the realm of

Left. Worm's eyeview of fine Highland bentgrass turf. Mowing height here is less than one inch.

Comparison between a creeping bent (top) and Highland bentgrass (bottom). Highland has less tendency to produce the long, trailing stems that root at the joints and weave troublesome thatch quickly. All plants were plucked from adjacent Lawn Institute plots, treated alike.

Field-combining of Highland bentgrass in its adopted Oregon home near Salem. The seed is harvested during dry weather in early autumn.

quality turf grasses, let's take a look at the "curious case of Highland bentgrass," about which we can speculate a bit more readily because of the geographical confinement of the modern product and its production. The diverse terrain of western Oregon, where bentgrasses are so much at home, supplies many ecological niches within a relatively small geographical area, too.

Highland History

Harry A. Schoth at Oregon State University has checked up on the early history of bentgrasses in Oregon, to the extent that the imperfect and fragmentary evidence allows. It is Schoth's belief that the many cultivars (or even entities regarded as botanical species) probably originated from introduction of unselected European lots of "mixed German bent." As this polygot bent was spread widely on the west slope of the Cascades, there was apparently natural selection of variants for differing habitats.

Today, there are several recognized species or cultivars, corresponding roughly to different climate and locale. The taxonomy of the bentgrasses is very confused. Most agriculturists follow Peck's treatment for Oregon and Hitchcock's (Chase) *A Manual of The Grasses of The United States,* in which creeping bentgrasses are given specific status as *Agrostis palustris,* colonial forms (including Highland and Astoria) specific status as *A. tenuis.* In addition, a coarser haygrass species, generally termed redtop, is considered *A. alba* in Hitchcock's manual. Not all authors recognize these delimitations nor necessarily these specific names (viz. Abrams' *Illustrated Flora of The Pacific States*).

The situation is further complicated by many recent introductions from the far corners of the world, and by a wide number of non-commercial specific entities which most authors treat as endemic. The taxonomic relationships are confused not only in the United States, but in Europe and elsewhere. At present Chris Eisele of Darmstadt, Germany, is inquiring of informed persons throughout the world in an effort to make some sense out of bentgrass classification in Europe. There is real incentive for this in Germany, because taxation on the sale of seeds differs significantly whether the grass be classified as an agricultural species (as redtop would probably be in this country) or as an ornamental species (as most creeping bents, and velvet bent, *A. canina,* would be). *A. tenuis,* as presently understood, could justifiably be considered either, depending upon choice of example.

Highland's Hills

A segregate from the bentgrass complex in Oregon found certain cleared hills in the foothills of the Cascade Range just southeast of Salem, Oregon (Willamette Valley), very much to its liking. Indeed, in this relatively restricted area, Highland bentgrass, as it became named,[1] has proved irrepressible. Here old fields turn to Highland bent, just as cultivated soils in the upper Midwest turn to Kentucky bluegrass. The grass seems ideally adapted to make a fine protective cover on land generally too sloping for cultivated crops, and has extended its domain appreciably in the last three decades.

Although differences are not invariable and perfect, the cultivar now recognized as Highland bentgrass seems distinguishable from the creeping bentgrasses in seed, panicle, and ligule characteristics, and in general mass appearance in the field. Distinction between Highland and Astoria, both of them *A. tenuis,* is not so easily recognized, and scarcely possible on the basis of voucher specimens alone. But agronomists who are familiar with the growing characteristics feel that recognition is possible, at least during certain stages. It stands to reason that there is some segregation of genes to conform with habitat, for Astoria bentgrass is grown on low-lying soils, generally high in peat and "swampy" until drained, in the more coastal areas where rainfall is exceptionally heavy (up to ninety inches per year).

By contrast, Highland bentgrass flourishes in the hilly region where soils are heavier and better drained, where summers are hot and bright, and where rainfall is more

1. Hyslop and Schoth recognized it as a distinctive "variety" in 1926. The first seed was harvested in 1927 from a volunteer stand. Certification status was accorded in 1934.

Stripping natural Kentucky bluegrass near Winchester, Kentucky. Grass in the foreground has had the seed heads combed from the stalks by the stripping machine (three pulled in tandem by a tractor). Seed from all fields and ecological situations is joined in stripping, and in the curing yard.

Seed stripped in surrounding fields is brought to a central curing yard, where it is carefully watched and turned (to prevent heating) as it dries and "after-ripens." Col. Ed Spears and Ben Goff direct the dispersal of green seed in the curing yard on the Goff Farm. Mr. Goff supervised more than fifty harvests on his farm.

limited (in the neighborhood of forty inches, mostly during winter). The Highland cultivar is almost indistinguishable from what is marketed as "Colonial" bentgrass, the latter having become the approved common name for all *A. tenuis.* Seed from the circumspect Highland area is termed "Highland Colonial," while that from other sections simply "Colonial."

Highland Versatility

The parallel between Highland bentgrass and Kentucky bluegrass is interesting. Natural Kentucky bluegrass, with a complex and extensive gene assortment, has supplied candidate grasses which have made first-rate ecotype cover in many differing habitats thousands of miles apart in this country. Evidently Highland is a segregate out of a similar broad complex of bentgrasses, made by nature but recognized and perpetuated by man. Highland is thus bequeathed a fine measure of identicalness nicely blended with a generous measure of subtle genetic variability which should stand it in good stead as a lawn grass. This chance alliance of adapted segregate with unusual foster habitat satisfied an ecological situation somewhat peculiar for bentgrass. One would not expect a bentgrass to do so well as does Highland on unirrigated hills where summers turn hot and dry—such as are summer conditions in the hot midwestern United States, which is generally considered poor habitat for bentgrasses.

The question is inescapable: if a bentgrass segregate has become adapted to such an ecological situation in Oregon, why would it not fit similar climates in the East? Certainly it seems as though it should[2]. But it is questionable whether the pure Highland cultivar has been thoroughly enough and widely enough tested through the eastern United States to know. In good "bentgrass country" of the eastern United States, such as near the Great Lakes and in New England, much volunteer bentgrass is already growing, possibly some native, but more likely escapes from seed mixtures sown in the area through the decades. Included are many variants which form dense colonies or "mats," which are both distracting and difficult to care for when they invade lawns planted to other grasses. For this reason, the name "bentgrass" has not been looked upon favorably everywhere.

Experience with Highland bentgrass on the grounds of The Lawn Institute, however, indicates that it is not an aggressive invader of bluegrass—indeed the reverse seems to be true. We are intrigued by the possibility that this may be a bentgrass for hot, dry summer conditions, which can survive in midwestern lawns which must be clipped closely, without all the meticulous care generally required for creeping bentgrasses. Maybe here is a cultivar among lawn grasses which satisfies a condition against which Gleason Mattoon in his *Horticultural Newsletter* takes umbrage for ornamentals generally: "How different from the newer hybrids these old favorites [speaking of ancient plantings noted on abandoned farms]. [Newer types] are precocious and colorful, but they lack qualities we long for in flowering shrubs and garden perennials. More especially we ponder on the continual urging to spray, prune, protect, fertilize, weed, and cultivate. Do the new kinds require such babying? If so, forgive us for longing for plants which will persist with neglect and continue to fulfill their roles in this complex world, without the necessity for giving them a daily injection or feeling their pulse weekly."

2. Harry A. Schoth, Professor Emeritus at Oregon State University, an outstanding expert on Highland bent, states: "Highland bent is very versatile, so far as soils are concerned. It is considered as perhaps the most satisfactory of the bents for low fertility soils and soils that may get quite dry during some periods of the year . . on the other hand, it will succeed on lands that may be quite wet during portions of the year . . . Its use for turf is the result of wide adaptability, ability to withstand heavy abuse, generally satisfactory color, texture and appearance, comparative freedom from disease and insect attack, and good sod-forming ability that will stand heavy tramping without lasting injury."

GREAT SWAMP (Continued from page 170)

with its reddish bronze coloration and its seed stalks looking rather like large, artists' brushes. How many species in these three great groups of plants there are in the Swamp, only time and patient identification will tell.

We who are attempting to make a herbarium of the plants of the Great Swamp are more and more impressed with the wealth of species. Including the algae, fungi, and bryophytes, the list (if ever completed!) will run into the thousands, perhaps three thousand or more. As time passes, such a permanent record will become more and more valuable. When changes in habitat occur, as the result of the creation by the United States Fish and Wildlife Service of more areas of open water for migratory water fowl, some stations of plants will disappear and new ones will be created.

An account of the Great Swamp would not be complete without reference to the effort of the many people who have united their forces to save this noble example of the world of nature. The Great Swamp Committee, formed before the threat of a jet port, and continuing unstintingly now that the immediate threat has passed, has been the guiding force. But the Committee welcomes the support, moral and financial, of interested individuals and groups.

THE STORY OF CALLAWAY GARDENS

By DOROTHY EBEL HANSELL

CASON CALLAWAY, Georgia industrialist and philanthropist, built a retreat on the pine mountains twenty-seven miles north of Columbus, eighty-odd miles south of Atlanta. He removed the dead timber and tangled brush from acres of pine forest, allowing dogwoods and azaleas to grow more freely and revealing native plant treasures on the forest floor. He opened up broad vistas of mountains and valley, built lakes from crystal-clear mountain springs, and set out extensive plantings of hollies. Then taking a look at the rejuvenated landscape, he questioned, "All this beauty for one family?"

Mr. Callaway decided that this beauty should be shared with others, and in 1952 he opened Callaway Gardens at Pine Mountain (then Chipley) to the public. He established Callaway Gardens Foundation, making provision, however, that the Gardens be, to a great extent, self-supporting. Mr. Callaway's son Howard is now President of Callaway Gardens Foundation and Executive Director of Callaway Gardens.

The greater portion of the twenty-five-hundred-acre tract remains wooded, abundant in pines, with some oaks, tuliptrees, and magnolias, which shelter dogwoods, hollies, azaleas, red buckeye, oakleaf hydrangea, sweet-shrub, redbud, fringe tree, and wild flowers. But nature's bounty is not overwhelming, for the colors are soft and delicate: in April, the glistening pure white bracts of *Cornus florida*; the pink bracts of *C. florida rubra,* not the harsh pink of some of the hybrids but a clear light pink; the translucent pink, also white of *Rhododendron canescens*; the whites and pinks of *R. nudiflorum*; the rich yellow to orange of *R. austrinum*; later, the yellow to flame colors of *R. speciosum* and *R. calendulaceum,* the rose of *R. vaseyi,* the crimson of *R. prunifolium,* the white and shell-pink of mountain-laurel *(Kalmia latifolia).* Here and there the showy compound leaves of red buckeye *(Aesculus pavia),* and its red to purplish panicles in April, or the long, broad leaves of the oakleaf hydrangea *(H. quercifolia)*, and in June its sterile white flowers which turn purplish, focus attention—bright but not jarring accents among the paler colors.

From the woodsy ground wild flowers contribute to the spring picture: *Trillium catesbaei* nestled behind a tree, its nodding, pale pink flowers barely visible; *T. grandiflorum* passing its peak, the white flowers fading to a rosy pink; *Iris cristata* spreading its pale blue flowers across a patch easily fifteen feet long by four or five feet wide; zephyranthes nodding gently on their slender stems along the margin of a lake, the deep yellow flowers of *R. austrinum* a pleasing foil to their white lily-like blooms flushed rosy purple. And *Viola pedata!* Hundreds of six- to eight-inch clumps of the birds-foot violet at the very edge of one

Native azaleas and Atamasco-lily, or rain-lily, along the Azalea-Wild Flower Trail. Florida azalea *(Rhododendron austrinum)* on left and center, Piedmont azalea *(R. canescens)* on right.

Piedmont azalea *(Rhododendron canescens)* in woodland area.

Left. Close-up of Florida azalea *(R. austrinum)* and Atamasco-lily or rain-lily *(Zephryanthes atamasco)* along the Azalea-Wild Flower Trail.

of the roads in the woods, the pale lilac to deeper violet colors gleaming in the sunlight which flickers through the trees. Occasionally a smaller clump of *V. pedata alba* adds excitement to this enchanting sight.

This is natural landscaping at its best. Yet visitors stop at the gate house to inquire as they depart, "Where are the gardens? We have gone the full length of the Five-Mile Drive without seeing a garden."

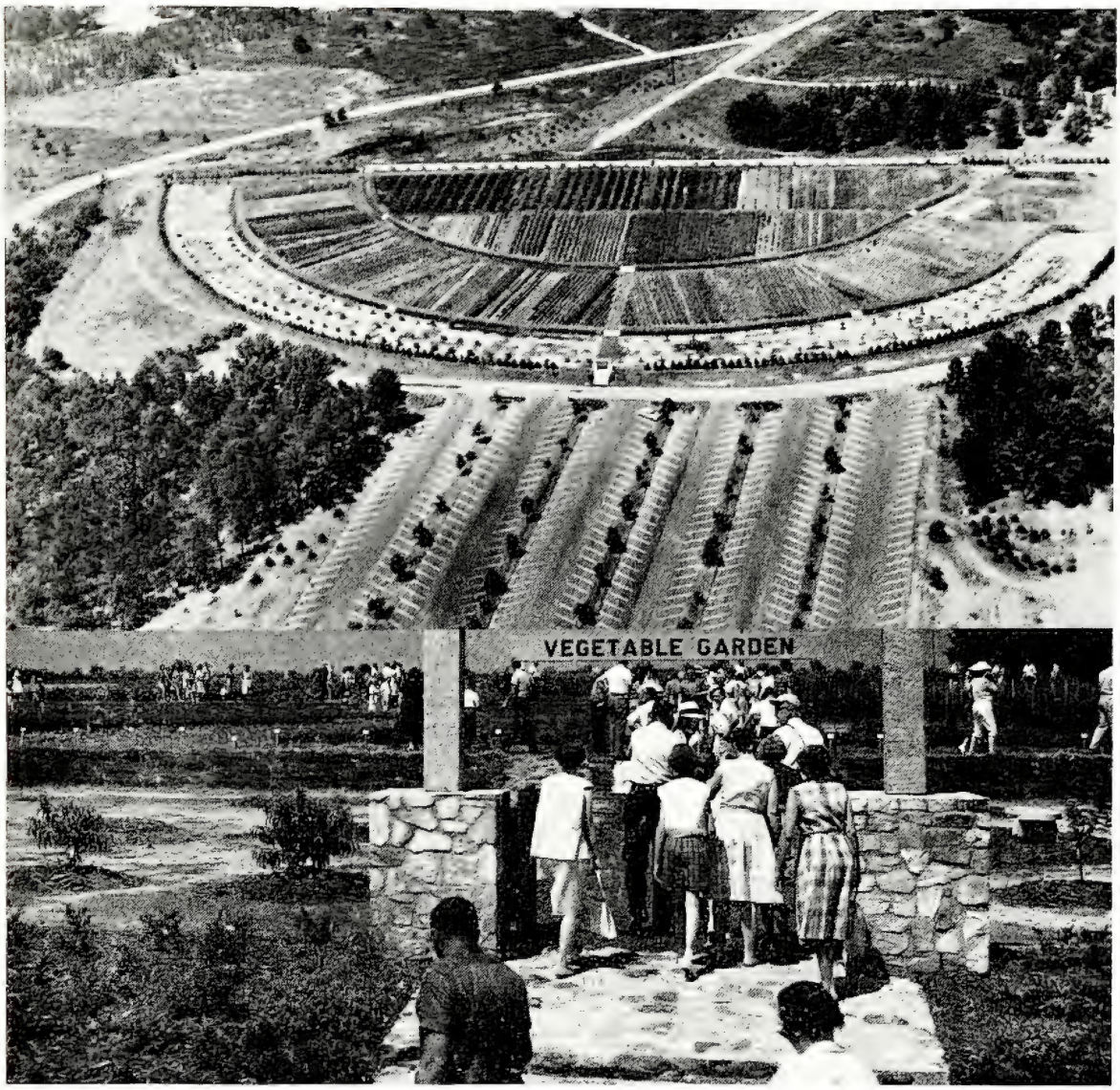
There are no formal flower gardens. The nearest approach to a garden is the planting of Glenn Dale and mollis azaleas, certain old and rare hybrids, and some exotic species. But here, too, the setting is natural.

There are rows of hollies—superb specimens of Burford holly line a section of the Five-Mile Drive; equally fine specimens of Chinese holly *(Ilex cornuta)* and yaupon *(I. vomitoria)*, several still heavily fruited in April, form a screen in back of the older of the two motel buildings; and a border of *I. cornuta* flourishes in front of the display room of the greenhouses. Callaway Gardens have one of the best, if not the best collection of hollies in America, including native and foreign species and varieties. The hollies made such a favorable impression on members of the Holly Society of America, who attended the Garden's Holly Seminar in the fall of 1962, that the Society will meet again at Callaway Gardens on November 7 and 8, 1963. It previously met there in the spring of 1954.

A seven-acre vegetable and fruit garden serves as a demonstration plot for new and older varieties, and for certain vegetables which were formerly popular in the South but are less frequently grown today. This garden and an orchard of slightly over one hundred acres also produce the fruits, vegetables, salads, and herbs for the family's table, for the dining room of the Club House, for Holiday Inn of Callaway Gardens, and for making the jams, jellies, pickles, and other preserves sold by the Country Store. It attracts many visitors; children especially are delighted to see how vegetables grow, but there are many adults to whom the garden is a revelation.

Fifty different vegetables, including Chinese cabbage, collards, kohlrabi, mustard, okra, parsnip, southern pea, salsify, garbanzo bean, lupini bean, soybeans, and twenty-seven herbs are raised. To list all three hundred varieties is not feasible, but the ones given here indicate the choice available to those who are entrusted with the culinary departments of Callaway Gardens, and also what will produce well in the Georgian mountain climate.

Beans, bush snap, green-podded—Topcrop, Harvester, Extender, Wade, Bountiful, Tendercrop, Executive, Royalty, Streamliner, × P-260; bushsnap, wax podded—Cherokee Resistant Strain, Pencil Pod Black Wax; pole snap, Kentucky Wonder 191, McCaslan 42, Alabama No. 1, Stringless Blue Lake 231, Romano, Blue Coco, Asparagus or Yard Long; bush lima, Nemagreen, Thaxter, Henderson's Bush, Fordhook 242, Buttergreen, Dixie Butterpea, Jackson Wonder; pole lima, Burpee's Big 6, King of the Garden, Sieva, and Florida Butter.



Upper. An aerial view of the semi-circular vegetable and fruit garden at Callaway Gardens. The garden is built in three tiers; the first devoted to fruit trees, the second to perennial vegetables and herbs, and the third to berries.

Lower. At the entrance to the garden on a busy day in summer.

Cabbage—Golden Acre F_1 Hybrid, Matador F_1 Hybrid, Pioneer F_1 Hybrid, Red Round Dutch, Emerald Cross F_1 Hybrid, Louisiana All Year, Chieftan Savoy, Charleston Wakefield, Copenhagen Market, Marion Market, Greenback, Globe, Red Acre, Red Yellows Resistant, Wisconsin All Seasons, Golden Acre.

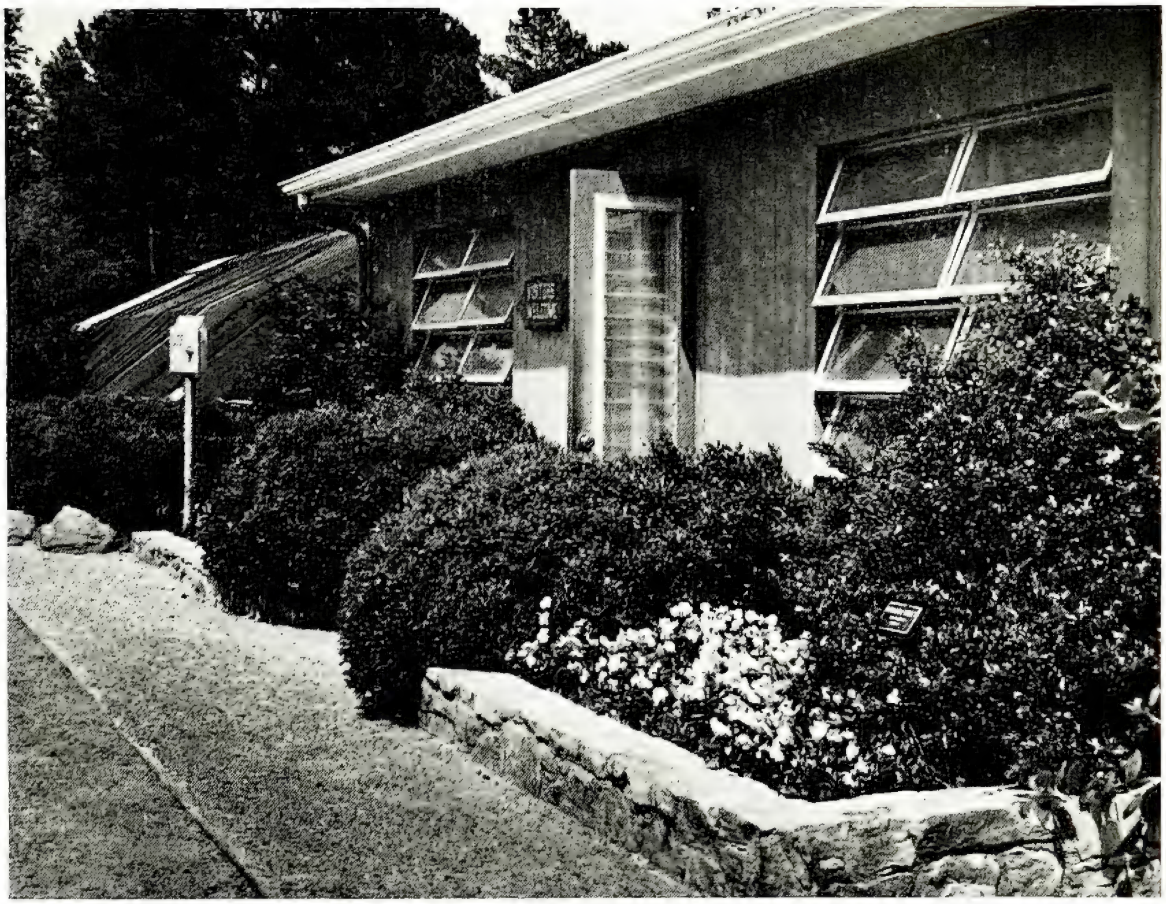
Corn—Dust, Midway, Merit, Aristogold Bantam Evergreen, Golden Security, Golden Cross Bantam, Seneca Chief, Calumet, Asgrow Golden 22, Ioana, Silvermine, Silver Liner, Supersweet, Illini Chief Supersweet.

Peppers—Keystone Resistant Giant, Yolo Wonder L, Delaware Belle, Long Thin Cayenne, Truhart Perfection Pimento, Hungarian Yellow Wax, Craig's Ornamental, Red Cherry, Tobasco.

Squash, summer—Greyzini, Cozella Hybrid, Caserta, Early Golden Summer Crookneck, Saticoy Hybrid, White Bush Scallop, Eat-All, Chichini, Zucchini Improved, Cocozelle Hybrid, Peto Hybrid Sq-28; winter—Hercules (Improved Butternut), Banana Pink, Royal Acorn, Buttercup, Hybrid "R", Hubbard Improved, Golden Hubbard, Striped Cushaw, Rainbow, Golden Delicious, Alagold.

Tomato—Manapal, Moreton Hybrid, Manalucie, Giant Italian, Burpee's Big Early Hybrid, Bigboy, Sunray, Homestead 24, Winsall, Early Giant Hybrid, Wonder Boy F_1 Hybrid, Marion, Jim Dandy, Paul Bunyon, Kopiak, Golden Boy, Peto Hybrid 5961, Chico (pear-shaped), Red Top V-9, Large Red Cherry, Yellow Pearl, Yellow Plum, Red Pear, Red Plum.

Charles Bruce, Horticulturist, who is in charge of fruits and vegetables at Callaway Gardens, practices the scientific methods which he learned as a student at the University of Georgia and in which he became proficient as fruit and vegetable specialist at the Georgia Agricultural Experiment Station at Athens. All of the staffs members are knowledgeable and experienced. Ben Pace, from North Carolina, a graduate of Ohio State University, is in charge of the greenhouse and nursery area. Franz Eifel, the plant propagator, who is a recent graduate of Ohio State University, received his early training in Germany, then spent several years at the Brooklyn Botanic Garden. William J. Brown, Director of Education, attended North Carolina State College at Raleigh and is a protégé of William Lanier Hunt, the well-known horticulturist and writer. Fred C. Galle, Director of Horticulture, earned his Masters degree from Ohio State Univesity in 1947. Then for five years he was Assistant Professor of Horticulture at the University of Tennessee, during which time he started work toward his doctorate in botany. He completed all course work and seven years of records on an azalea problem in the Smoky Mountains for his thesis—and lost the records in an encounter with a bear in the mountains! Mr. Galle spent a year at Ohio State as a member of the faculty of the Department of Horticulture before joining the staff of Callaway Gardens in 1953.

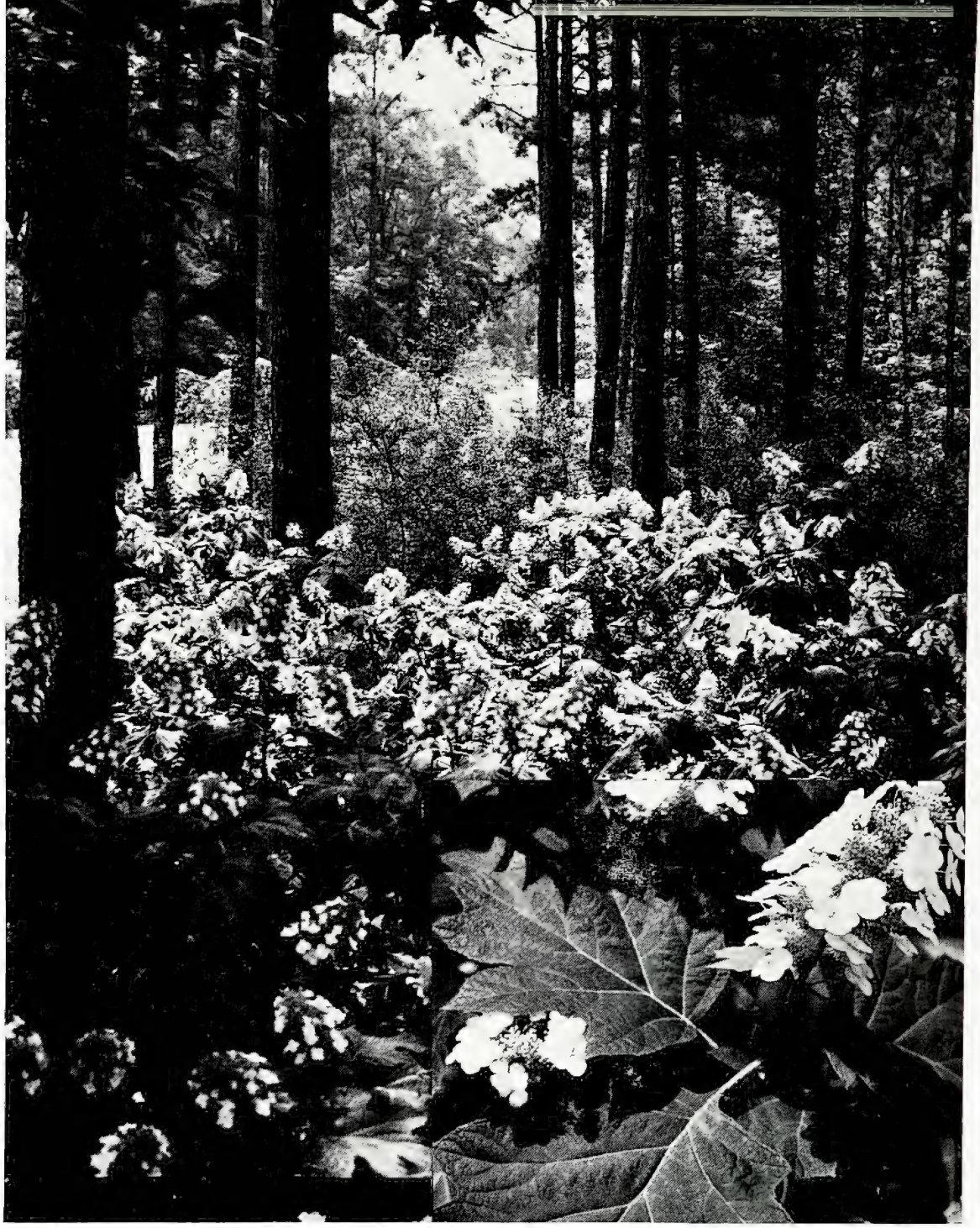


Ilex cornuta rotunda is planted in a raised bed in front of the Greenhouse Reception Room. The large hollies at the corners of the building are English holly *(I. aquifolium)*. The Reception Room also serves as a small education center, with seasonal displays, nature collections, and a limited library and herbarium.

On a Sunday morning, not yet seven-thirty o'clock, Alvin Davis, Executive Vice President of Callaway Gardens Foundation, was in the lobby of Holiday Inn of Callaway Gardens. "You must really like your work to be here so early on a Sunday morning," remarked a visitor. "I do, I love it," Mr. Davies responded. His enthusiasm is typical; not only are the staff members well informed, they are enthusiastic about their particular fields of endeavor and dedicated to the Gardens.

Close-up of *Ilex cornuta rotunda*, the dwarf Chinese holly.

There is an extensive planting of Burford holly along the Five-Mile Scenic Drive.



A mass planting of the native oakleaf hydrangea *(Hydrangea quaercifolia)* under pines with yaupon holly *(Ilex vomitoria)* in the background.

Insert. Close-up of the oakleaf hydrangea, which is used abundantly for a lovely white and green effect in early summer.

When opening Callaway Gardens to the public, Mr. Callaway realized that many families lack the resources to enjoy family living and recreation in beautiful surroundings, so he provided for the construction of seventy-seven cabins, modernly equipped, attractively furnished, and located in the cool shade of towering pines. The cabins, available at a nominal rent, accommodate families of one to six children —and no one may rent unless he has at least one child in his family! A recreational program in water sports and aerial gymnastics is conducted under the direction of students from Florida State University at Tallahasee. For the families occupying the cabins there is no additional charge for the program. Young people from the neighboring communities may participate at a fee of $5.00 weekly. "Strong active bodies and young minds alerted to nature make for good citizenship."

Living in the area, Mr. Callaway became aware of the depleted pine forests, the abandoned hickory orchards, the run-down unproductive farms. He encouraged re-foresting. He prevailed upon a group of bankers and business men to take over some orchards and farms as an experiment, thus demonstrating to them that the farmers needed short-loans to enable them to borrow money for fertilizers and equipment to improve their land and operation. The produce from the poor land was barely enough to give them a meager living—not enough to buy necessary fertilizers and implements.

The Gardens are a memorial to his mother Ida Cason Callaway, but they are a living tribute to Cason Callaway, a man of vision and generosity, who made it possible for others to share his appreciation and enjoyment of natural beauty. Mr. Callaway died in April, 1962.

WATER
A Feature of Swiss Gardens

By ALICE DUSTAN KOLLAR

Mrs. (Samuel) Kollar is a landscape consultant, Garden Editor of the *Newark Star-Ledger,* author, and lecturer.

In Switzerland water is used in almost every garden, private or public. Originating in clear mountain streams, it is piped or otherwise diverted into many fascinating patterns.

Swiss designers employ ingenious methods in introducing water into gardens. Thus at the first national Swiss horticultural show—the "G-59" held in Zurich four years ago—their ideas for home gardens ranged from natural-looking features, as pictured, to extremely modern treatments. One design resembled a huge angular butterfly, its double pool forming two wings bridged by a rock slab.

With plenty of rock available, and in variety, talented Swiss stone masons have done their best in producing beautiful basins for pools and fountains, some of which are boldly carved in granite, others more intricately in sandstone and marble. Still others are built of less common rock, such as tufa. Within recent years in Switzerland, as in California, concrete has become a favorite material for ornamental pools in some public and many private gardens.

Walks through the streets of Bern, Zurich, and other large cities of Switzerland, visits to parks and botanic gardens, and glimpses into private gardens delight the horticultural tourist not only because of the wide variety of flowers, but because of the water features as well.

Upper. Street fountains dating back to the sixteenth century are found in Bern. This one, which helps divide the traffic lanes on one of the main streets, has four spouts and is topped by a colorful historic figure. It is underplanted with built-in flower boxes.

The arcades in the background are characteristic of the medieval parts of this city, now the capital of Switzerland.

Lower. Garden whimsy is expressed in this dooryard with a boulder spouting water from a pipe run through the center. The clay gnome on the right is fishing in the catch basin.

A small rose garden and geranium-filled window boxes furnish a colorful background for the water feature of this tiny garden beside the Aare River in Bern.

A granite basin with an outsize salamander (or is it a miniature dragon?) carved into the rim stands in a little park near the railroad station in Appenzell.

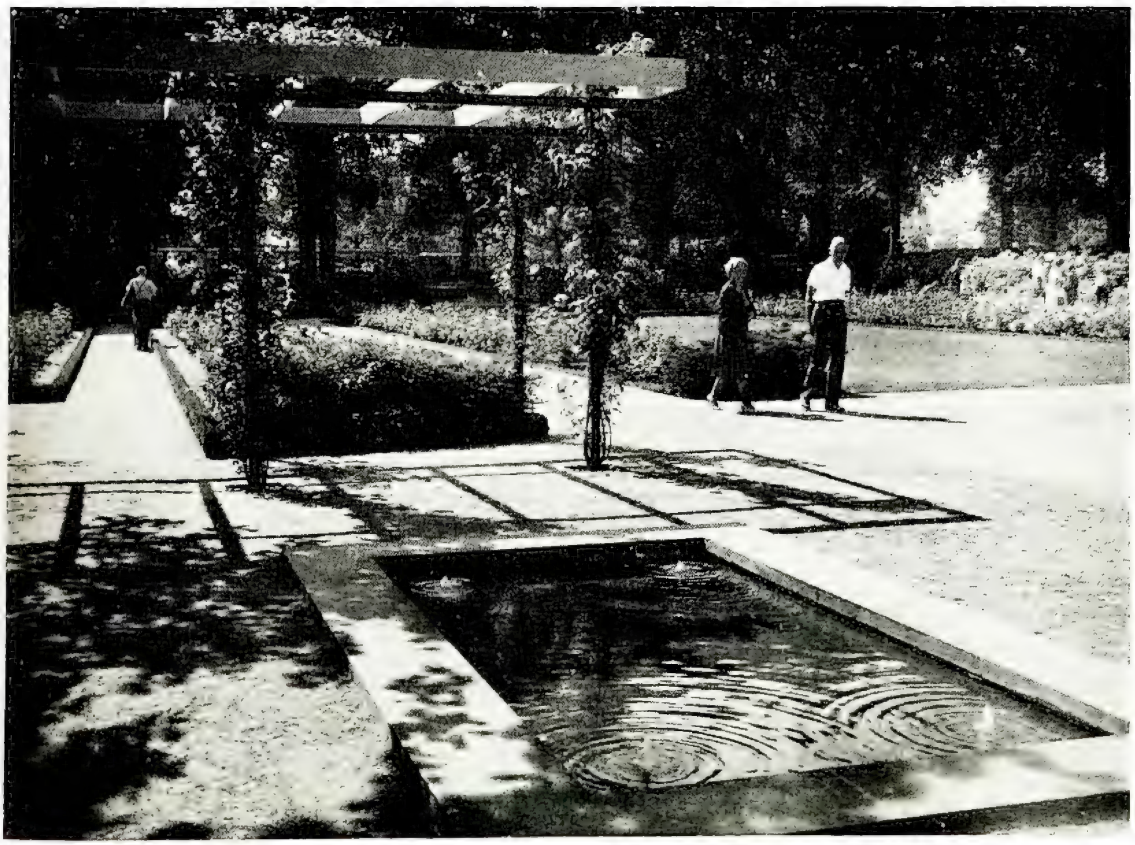
This water feature, an attraction for children especially, is but one of the many artistic expressions by townspeople. Lacemaking in homes and floral patterns painted on hotel and store facades are other contributions which make Appenzell a charming town in the midst of rural greenery.

This pool, tucked into the hillside, was part of the first Swiss horticultural show, held in Zurich in 1959. The bronze cranes appear to be ready to wade into the clear water.

The bottom of the basin grades from a smooth edge to small pebbles, then larger ones, and finally to stones of a size which tie in with the rock work above. The rocky stream bed is crossed by a cut-stone bridge connecting flagstone paths.

Moist pockets at pool level hold yellow flag and Siberian iris (*I. pseudacorus* and *I. sibirica*).

Useful as well as handsome is this dipping well with faucet, which stands in the corner of a little walled garden in Bern's botanical garden. The rough-hewn tufa rock supports a slope on which grows a dwarf spruce (*Picea glauca* var. *albertiana*) and low junipers. In bloom above the dipping well is *Genista silvestris* var. *pungens (dalmatica);* below are *Teucrium aureum* and other gray-leaved rock plants.



This modern pool, built of concrete, creates the illusion of coolness in a sunny area in Bern's public rose garden. Four low jets give light sound and ripples to its sheet of water, yet allow reflections from the rose arbor behind. The climbing roses are varieties 'Parade', a pink, and 'Blaze Superior'.

TREASURES OF THE GARDEN'S HERBARIUM II
THE COLLECTION OF KARL FRIEDRICH MEISSNER

By RUPERT C. BARNEBY

Mr. Barneby is Honorary Curator of Western American Botany at The New York Botanical Garden.

THE LIFE OF Karl Friedrich Meissner[1] was the outwardly uneventful one of the scholar and pedagogue. He was born at Berne, Switzerland, November 1, 1800, son of a distinguished zoologist of the same name, and died at Basle, May 2, 1874, having spent almost his whole life in his native country. In his youth he studied medicine and botany abroad, at Vienna and Paris, and finally at Göttingen, where he received a doctorate in medicine in 1824. His first and lasting interest was botany in its systematic aspects, and after his formal education was complete he moved to Geneva, attracted by the fame of Augustin Pyramus DeCandolle. There, under DeCandolle's influence and inspiration, he wrote his first botanical work, *Monographiae Generis Polygoni Prodromus* (1826), the text from which the modern taxonomy of the knotweeds and docks is derived. In 1830 he became professor of botany and director of the botanic garden at Basle, a post which he retained for over forty years. His most ambitious work, *Plantarum Vascularium Genera,* appeared in parts during the years 1836-43. This is a systematic synopsis and commentary on the genera of the world's higher plants as known up to that time, and is one of the forerunners of Bentham and Hooker's Genera and similar texts. It was dedicated to nine of the leading botanists of the age, to Robert Brown, Wallich, the elder DeCandolle, Jussieu, Kunze, Martius, Roeper (Meissner's predecessor in the chair of botany at Basle), Shuttleworth, and Wight, and established his reputation as their peer. Meissner's Genera is meticulously composed and contains much original matter, but its success was impaired, according to Alphonse DeCandolle, by its bulky folio format, and it seems that the contemporary though not intrinsically superior Genera of Endlicher was generally preferred. In his middle and later years Meissner contributed treatments of several large and important families to DeCandolle's Prodromus, the *Polygonaceae* (except *Eriogoneae*), *Proteaceae, Thymeleaceae,* and *Lauraceae,* and he afterwards worked out these same families, together with *Convolvulaceae* and *Ericaceae,* for Martius' *Flora Brasiliensis.*

Meissner was not a field botanist, his herbarium being built up through correspondence with many of the leading collectors and botanical authorities of the era. As might be expected, his collection is particularly rich in members of

Right, type (holotype) of *Polygonum phytolaccifolium* Meissn. ex Small, collected in California, supposedly by Hugh Cuming.

Left, an apparent isotype of the same, giving the collector, probably correctly, as Thomas Bridges.

the families in which he specialized, but his interests embraced the entire plant kingdom, and all groups of higher plants are represented. Meissner was among the first botanists to cite the source and situation of the specimens which he had examined in connection with his revisionary studies, and his own carefully annotated sheets, often accompanied by diagnostic notes in manuscript and sometimes by small anatomical drawings, illustrate directly his concept of the species described in the Prodromus and elsewhere. Meissner's active years corresponded with a period of botanical discovery, when the floras of the newer and more remote continents were being sampled seriously for the first time, and as a consequence he described a very large number of new species, the majority of which are represented in his herbarium by type material.

Meissner's health failed in 1866. Well aware of the value of his botanical collections, he started to look around for a permanent home for them. He had corresponded with Gray and with Torrey in earlier years, and it was through this connection that a purchaser was found in the New World. The collection was bought by John J. Crooke[2], the patron of botany, who later presented the Chapman herbarium to Columbia University, and donated to the Torrey herbarium. Technically, the Meissner herbarium is still part of the Torrey collection and the property of Columbia University, but is on permanent loan to and fully integrated with the Garden's Herbarium. The Meissner herbarium is unquestionably a large one, but I have been unable to discover its precise size. The Library at the Garden possesses an old manuscript catalogue describing the packages in which the collection was received, but there is no estimate of the number of sheets.

The specimen chosen to illustrate the Meissner herbarium is the holotype of *Polygonum phytolaccifolium*[3] Meissn. ex Small, a perennial knotweed native to the mountains of northwest America, where it ranges from Alaska south to Idaho and the Sierra Nevada in California. It was selected for two reasons: it brings to mind Meissner's youthful but enduring interest in the Knotweed Family; and it demonstrates the continuing value of a plant specimen handed down from one generation to the next, which is a prime function of herbaria in general. As shown by the label in Meissner's handwriting, the specimen was recognized by him in 1867 as representing an undescribed species related to the alpine knotweed of the Old World (*P. alpinum* All.); but Meissner was already in poor health, and no opportunity occurred to publish a description. In the early 1890's John Kunkel Small, later to become one of the Garden's most distinguished curators, was a graduate student at Columbia engaged in preparing his doctoral thesis on the subject of North American *Polygonum*[4], a theme to which he may well have been attracted by the presence of Meissner's uniquely valuable collecton in New York. In a preliminary paper[5] Small took up Meissner's manuscript name, citing the illustrated sheet as the type. The absence of any annotation by Small is curious but not without precedent.

An odd feature of the label as copied by Meissner is the attribution of the collection to Cuming. The famous conchologist and field naturalist Hugh Cuming (1791-1865) collected extensively in Chile and subsequently in the Philippines, but he was never in California nor did he ever enter the known range of *Polygonum phytolaccifolium*. The specimen reached Meissner through Lenormand[6], and the error may well have occurred in the course of transcribing labels. It seems almost certain that the collector was in reality Thomas Bridges[7], who collected plants in California from the year 1856 until his death in 1865. The Garden's Herbarium possesses a Bridges specimen of *P. phytolaccifolium* which very exactly matches Meissner's plant in its age of development, habit, and particularly in minute details of discoloration; I believe it to be an isotype. Bridges' widow left her husband's residual collection to the Smithsonian Institution, and it was distributed in 1867 by John Torrey. The coincidence of the date 1867, the year that the Bridges collection was dispersed and that Meissner received (or at least annotated) the specimen, is very suggestive, and the fact that Mrs. Bridges was Cuming's niece offers an additional link between the two celebrated English naturalists. It seems probable that the plant traveled from Mrs. Bridges to Torrey via the Smithsonian Institution, thence to Lenormand in France and Meissner in Switzerland, only to return to the Torrey herbarium where it found a permanent home. Such often are the histories lying behind the wisps of hay to which botanists dedicate their lives and fortunes.

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1. The name Meissner, pronounced with a sibilant *s*, is variously spelled Meisner or Meissner. The family, of Hanoverian origin, settled in Switzerland, and until the orthographic reforms, which took effect after 1850, Karl Friedrich and his father were consistently Meisner. The spelling was retained at least up to the sixteenth volume of DeCandolle's Prodromus (1857) and is found in the genus *Meisneria* DC. The name only becomes Meissner in Martius, and it will be noted that the herbarium stamp on the Garden sheets says Meisner herbarium. The chief source for Meissner's life and career is the necrology and eulogy by A. DeCandolle in Bull. Soc. Bot. France **21**: 279-283. 1874.
2. John J. Crooke, engineer and metallurgist, patron of the natural sciences, was a friend of the leading American naturalists of his era. The plant genus *Crookea* was named in his honor. See Britton in Jour. N. Y. Bot. Gard. **11**: 160-161. 1911.
3. The epithet is properly spelled *phytolaccifolium*, not *phytolaccaefolium*, as Meissner and subsequent authors have it. The method of forming adjectives such as *phytolaccaefolius* or *castaneaeformis* is an ill-understood echo of the pre-Linnaean phrase-name where a plant might correctly be named the knotweed with leaves of pokeweed, or *Polygonum Phytolaccae folio*. The adjective meaning phytolacca-leaved must be derived from the root, not from the genitive: phytolacci-, castanei-, etc.
4. Published as "Monograph of the North American Species of Polygonum." In Mem. Dept. Bot. Columbia Univ. **1**: 1-84 + 84 Pl. 1895.
5. In Bull Torr. Club **19**: 361. 1892.
6. Sébastien René Lenormand, 1796-1871, amassed a large herbarium by exchange and purchase; it is preserved at Caen, Calvados. His exquisite handwriting can be seen at The New York Botanical Garden on the labels of the set of Veillard's New Caledonian plants, acquired in the Canby (College of Pharmacy) herbarium.
7. Thomas Bridges, 1807-1865, was one of the collectors financed by the Royal Horticultural Society. He traveled widely in South America and is remembered for his introduction to England of the giant Amazonian water-lily, *Victoria regia*. According to Johnston (in Cont. Gray Herb. **81**: 105. 1928) his itineraries in California are mostly unknown.

The season of the year seems now to invite you to the pursuit of botany; a science which, if not essentially necessary to you in the line of any particular profession, is at least deserving some share of your attention as men, as rational beings. WILLIAM CURTIS: *Lectures in Botany*

CONVERSATIONS ON ECOLOGY V

The present series started in *The Garden Journal's* January-February issue with a letter addressed by Dr. Pierre Dansereau to Dr. Frank E. Egler. It posed a number of questions on the theme of ***vegetation management*** which had been at least implicit in Rachel Carson's book *Silent Spring*. Comments were made, in subsequent numbers, by Dr. Egler (March-April), by Dr. R. R. Humphrey (May-June), and by Dr. Luna B. Leopold (July-August).

THE NEW YORK BOTANICAL GARDEN
NEW YORK
July 26, 1963

Dear Friends:

Your three letters light up very different facets of the emerging science of vegetation management, and I wish to thank you for your contributions. I shall use them as stepping stones rather than milestones and attempt to take off in all three of the directions you have pointed to, only to boomerang back to our common centre, which I assume to be a preoccupation with our own contribution, as scientists of a certain fraternity, to our society as a whole.

I too, Frank Egler, will refrain from tossing bouquets (although I should probably be ashamed to admit that I am more prone to enjoy the "toss-effect" than you are!). I do feel bound, however, to look back upon your published work of the last two decades, and although you would be reluctant to serve as a model for anyone, young or old, I do think your endeavours are exemplary. Granted also that we would have our ideas rather than our behaviour stand for judgment, I refuse to separate the man from his works, as I have had occasion to say publicly at some length, recently[1]

About ten years ago, in St. Louis, in the always redoubtable presence of students, I asked you why a man so obviously gifted for the more rewarding risks of theoretical speculation spent so much time dabbling in rightofways, herbicides, and generally educating engineers and vice-presidents of industrial companies, whereas his fellow-ecologists were so much in need of the elucidations and thrashings that you had by then administered. Your pursuit of the philosophic implications of the study of vegetation,[2] and, in many of your later publications, your examination of the psychology of the "ecological approach" should have acquainted us much better with ourselves. Not very much happened until you provided an unmistakable application of these principles to current practice.[3] This frontal criticism, frankly labelled as such, could not be ignored, whereas the demonstrations you had given in your Oahu[4] and saline everglades[5] papers are maybe only now achieving full recognition.

Why, I asked, did you bother with herbicides when you could strike much higher? I am sorry to report that I do not remember exactly your answer at that time, but I think it is now explicit (and eminently readable) in one of your most recent contributions.[6] If I venture to catch this dangerous creature by the tail, I find that it says, in the end (pp. 302-303): "Too many men of knowledge are in the service of men of power. Too many men of knowledge are shrinking from lofty goals in favor of the safe and the compromising. Too many men of knowledge fail to fit that characterization of Edmund Burke (1729-1797) that 'Those who would carry on great public schemes must be proof against the worst fatiguing delays, the most mortifying disappointments, the most shocking insults, and, worst of all, the presumptuous judgment of the ignorant upon their designs.' There are not enough Communicators of Biologic Knowledge in America, . . . whereas the Communicators of faulty, inadequate and erroneous knowledge are frequently usurping the field, against the public interest."

Although I keep my distance from Burke, I can only consider this a convincing answer to my question of 1952. If we have faith in our mission as scientists (and if we do not, we are mere dilettantes), some of us must do without interpreters and carry the message ourselves and unseat the false prophets and the exploiters of science.

The choice you have made, Robert Humphrey, although you modestly say it was dictated by circumstances, could not have been a valid one if you had not retained your faithfulness to pure ecology whilst dedicating your everyday efforts to range management. Communication is a two-way affair, and it is workers-in-the-field like you who have kept the lines open. An active feed-back of practical experience to pure science demonstrates the great need that vegetation science has of responding to the claims of the human population, at the same time analyzing objectively the effects of man's interference upon the landscape. (The voluminous Wenner-Gren book,[7] to which both Egler and Leopold contributed, "made the point," back in 1956, and it continues to provide us with valuable data and live ideas.)

Your adoption of the ecosystem as the basic unit[8] is in recognition of the fact that ecology (and therefore vegetation study) is not entirely a biological science, but lies at the point of confrontation of physical (geological, pedological, meteorological) and biological forces at various degrees and in various states of conflict and harmony. Certainly the pressure of range managers, foresters, engineers, and agriculturists in their search for objective means of evaluating yield and predicting productivity should have led the pure ecologists long ago to devise methods of measuring the potential of vegetation. A properly ecological perspective on productivity[9] has been as slow to emerge as had been a non-agricultural classification of soils, almost two generations ago!

You state very truly, moving to yet another plane, that "a physiographic unit cannot be managed" (and I do not know whether Luna Leopold agrees with that[10]), but "its resources can." But how? Does our present knowledge of the dynamics of the landscape provide us with the standards of predictability that make for "scientific" management? You say in the preface of your book[8] that "range ecology is not range management" and you hold fast throughout to that distinction, exploring many unsolved questions, such as the relation of a high dynamic status in vegetation (such as "climax") vs. productivity. Where range management is involved, we actually move into another sphere: demography, sociology, politics.

And such is the question which you pose, Luna Leopold, in addressing yourself not so much to our colleagues as to the community of citizens. They may well ask us, with the immense respect which is reserved for experts: "What is the *best use* of this landscape?" And we must ask them right back, as you have: "Do you value a row of trees more than a drugstore? Do you prefer a homestead to a dam?" Or in other words: "Will you walk another block for your aspirins? Do you mind paying a little more for your electricity?" Of course, what is to be saved does not always have the dramatic appeal of the Egyptian temples that are menaced by the Aswan barrage on the Nile! But the great sacrifices which our democracy makes every day in favour of the "little man" are offered on the same altar, are they not?

Conservation deals in *values* essentially, almost exclusively. How right you are to say that we must *first* decide what we cherish in our environment and *then* ask ourselves how much it will cost, what else we might have to give up in its favour! Not many engineers speak this language: in their own blend of humility and arrogance they are often too ready to be good soldiers who loyally offer their technical services only. It is not surprising that you, the son of Aldo Leopold, should have perceptions that a slide-rule cannot measure. And it is not surprising either that you should be in a position to pick up one of the unanswered challenges of environmental study: I refer to physiographic ecology, foreshadowed by Fenneman and by Lucy Braun and now put to the test by such men as Strahler and Wolman with whom you have collaborated. Your recent address on ecological systems and the water resource[11] restates this very forcibly.

The challenge to our minds is surely not to be met by moving backward to a more pastoral way of life which is incompatible with our present world. The emergent African nations offer us a spectacle of awareness and enthusiasm, and of generous acceptance of the contemporary requirements. It is my conviction that we have much to learn from them in the management of our affairs. Black Africa has already taught us a thing or two about the dance, and sculpture, and music. It will teach us something as well about human relations, if we show ourselves capable of the humility which it takes to break out of our cultural bonds and to free ourselves from the numbness of exoticism.

I do not apologize, dear friends, for rambling as I have from the realm of philosophy to the mystery of the African scene. These conversations are not intended to develop formal theorems. I hope you will feel moved to make further contributions in the same vein and in the same mood.

Yours sincerely,
Pierre Dansereau

1. "The Barefoot Scientist," an inaugural address at the dedication of the new Laboratory of the Institute of Arctic and Alpine Research of the University of Colorado, to be published in the *Colorado Quarterly*.
2. F. E. Egler. "Vegetation as an Object of Study." *Philosophy of Science*, **9**(3): 245-260. 1942.
3. F. E. Egler. "A commentary on American Plant Ecology," based on the textbooks of 1947-49." *Ecology*, **32**(4): 673-694. 1951.
4. F. E. Egler. "Arid Southeast Oahu Vegetation, Hawaii." *Ecological Monographs*, **17**:383-435. 1947.
5. F. E. Egler. "Southeast Saline Everglades Vegetation, Florida, and its Management." *Vegetatio*, **3**(4-5): 213-265. 1950.
6. F. E. Egler. "On American Problems in the Communication of Biologic Knowledge to Society." *Dodonaea*, **30**: 263-304. 1962.
7. W. E. Thomas, Jr. (ed). *Man's Role in Changing the Face of the Earth*. Wenner-Gren Foundation for Anthropological Research and the National Science Foundation, University of Chicago Press, xxxviii + 1193 pp. 1956.
8. R. R. Humphrey. *Range Ecology*. Ronald Press Co., New York, v + 234 pp. 1962.
9. R. L. Lindeman's contribution. "The Trophic-dynamic Aspect of Ecology" (in *Ecology*, **23**(4): 399-418. 1942) did not immediately start the ball rolling. More than anyone else's no doubt, Howard T. Odum's research of recent years has brought us closer to a grasp of this aspect of vegetation dynamics.
10. See his chapter in the Thomas book quoted in note 7, and also his book in collaboration with Thomas Maddock: *The Flood Control Controversy*. Ronald Press Co., New York, 1954.
11. Luna B. Leopold. "Ecological Systems and the Water Resource." *Geological Survey Circular* 414: 21-26. 1960.

MORNING-GLORY ACCUSED!

Reports are circulating that Mexico's wondrously blue morning-glory, *Ipomoea tricolor*, stands accused before the Food and Drug Administration, charged with containing a hallucinogenic drug.

During recent weeks staff members of The New York Botanical Garden have answered numerous questions for studies and articles by press, medical publications, and the Federal government.

It does appear, according to findings of the International Foundation for Advanced Study, at Menlo Park, California, that seeds of *Ipomoea tricolor* and its fittingly named varieties 'Heavenly Blue', 'Pearly Gates', and 'Flying Saucers', contain lysergic acid amides similar to the much-publicized LSD-25. But it would take a pretty seedy character to reach the goal of hallucinations—by eating two hundred to five hundred of the obsidian-hard seeds.

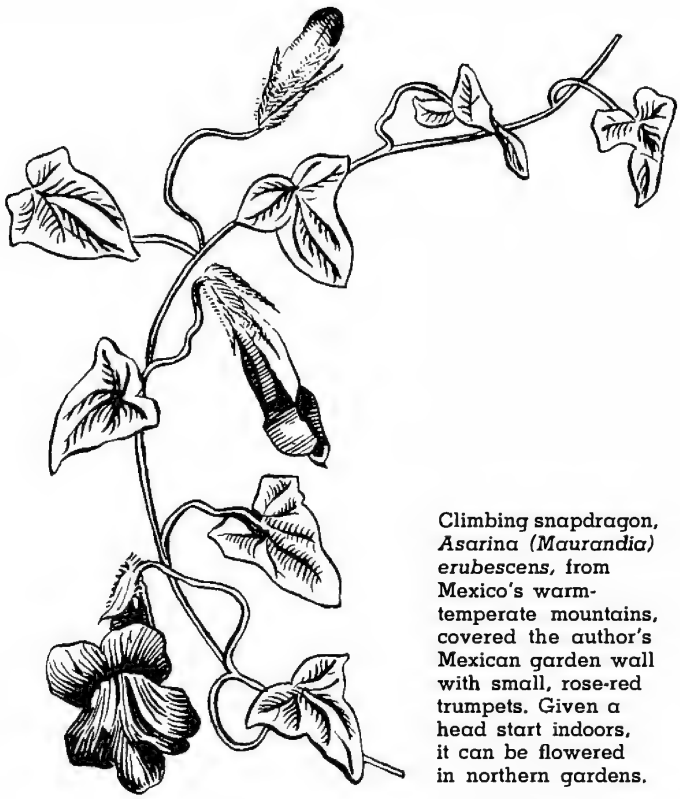
Before rushing to curtail sale of the seeds, would it not be wise for FDA to consider how many things in quantity are harmful? Eating a two hundred to five hundred page book, for example.

More interesting aspect of the affair is how it came up: for many years students of Mexican history had sought the secret of the mysterious *"ololiuqui,"* with which Aztec priests of ancient Mexico induced visions. Some years ago Thomas MacDougal, long-time botanical explorer of Mexico, observed Zapotecan Indians in southern Oaxaca eating morning-glory seeds—and the mystery was solved. It was the report of this finding that led to experiment with the seeds by scientists, and the merely curious and the present investigations. — P. C.

MEXICO'S PLANTS

By PHIL CLARK

Mr. Clark is Assistant to the Director (Public Relations) of The New York Botanical Garden. Mr. Clark, who is well infromed on the wealth of plants in Mexico, will conduct a Mexico-Guatemala Garden and Wild Flower Tour in October, 1963.



Climbing snapdragon, *Asarina (Maurandia) erubescens,* from Mexico's warm-temperate mountains, covered the author's Mexican garden wall with small, rose-red trumpets. Given a head start indoors, it can be flowered in northern gardens.

Continued from the July-August, 1963, issue.

VINES

MEXICO IS HOME to a host of vines, bringing a vertical source of color to "south-of-the-border" countryside and gardens. The vibrantly colorful vines are most striking, perhaps, in semitropical Cuernavaca where pink, red, and purple bougainvilleas, orange flame vine *(Pyrostegia ignea)* giant orange, blue, and red trumpet vines *(Tecomaria capensis, Thunbergia grandiflora,* and *Phaedranthus buccinatorius)* sometimes cascade in violent contrast over a single wall. In temperate Mexico City, color combinations of almost brutal strength are made up of red and pink climbing geraniums, white and purple solanums *(S. jasminoides* and *S. dulcamara),* pale blue leadwort *(Plumbago capensis),* orange climbing nasturtiums, and deep purple cathedral-bells *(Cobaea scandens).*

The traveler through the mountains on the Oaxaca-Tehuantepec highway will be startled again and again in autumn by the vivid coral-pink nets thrown by *Antigonon leptopus* over whole sections of countryside. This vine is known under several common names, coralita, confederate-vine, and *rosa de montaña.*

In the jungles of Veracruz, south of San Andrés Tuxtla, gleaming yellow allamanda clambers among the lower trees of the roadside where clearing has opened them to the sunlight. In the mountains on the Puebla-Jalapa highway, just before the descent, sharp eyes will detect white as well as the ordinary purple passion flowers. There is no trouble finding the bright blue flower clusters of petreas which hang on fences and trees along the botanically very scenic road that cuts from Jalapa to Fortin de las Flores. Petreas can be found in spring in most hot-country jungles of the Republic.

The chalices, nearly a foot across, of the cup-of-gold *(Solandra nitida),* handsome in both temperate and tropical gardens, are found growing wild in Oaxaca and Veracruz jungles. And growing over morning-glory trees *(Ipo-*

Water-hyacinth blooms, *Eichhornia crassipes,* turn this swamp sky-blue. A pest in many rivers of the world, Mexico's *"reina del rio"* is appreciated for its beauty in its native waters.

These tigridia flowers are white with lavender markings. The corms were grown for food in Aztec Mexico.

Echeveria gibbiflora flaunts its coral flowers above giant, bronzy leaves along Mexico City-Cuernavaca highway.

Fruits of the cut-leaf philodendron are as tasty as their scientific name suggests—*Monstera deliciosa.*

moea arborescens) in the hot, dry hills and valleys of southern Puebla are the yellow-throated, rose-violet trumpets of *Distictis lactiflora*—a startling sight from a distance, for it appears as if the entire tree were covered with blooms. A similar vine is the red or blood trumpet *(Phaedranthus buccinatorius)* with yellow-throated, deep purple-red blooms, wild in the canyons of Jalisco and San Luis Potosi.

The morning-glories of Mexico would fill a book by themselves. Most outstanding of the morning-glories is the one that has entered the United States under the name 'Heavenly Blue' and in Mexico is known as *manto de la virgen (Ipomoea tricolor).* Three of the wild quamoclits are important—the star-glory *(Q. coccinea),* cypress-vine *(Q. pennata)* for its feathery leaves, and the Spanish flag *(Q. lobata)* for its red and yellow, candle-form blooms.

Then there is a whole tribe of "inch" plants native to Mexico's temperate plateaus and mountains and to her jungles as well. Most have the semi-vining, creeper habit of the familiar house plant, wandering Jew, but others, like Moses-in-the-bullrushes *(Rhoeo discolor)* in Chiapas or the vividly blue *Commelina coelestis* of the Pedregal and other temperate areas, are upright. One little charmer, widely popular in Mexico as a hanging basket house plant and just beginning to appear in this country in that role, is the trailer *Leiandra cordata,* a small-leaved edition of the wandering Jew *(Tradescantia fluminensis)*—so similar, in fact, that it has been misclassified as *T. microphylla.* Lacking an English vernacular name, it might do worse than to take the Mexican name, *chisme*—for it spreads as rapidly as gossip. Another popular inch plant, the silver-barred *Zebrina pendula,* glamorously covers a cliffside near Ciudad Valles, on the Mexico-Laredo highway. All the members of this family have the typical three-petaled flowers borne by the northern spiderworts.

BULBS

Mexico is one of the best sources for colorful and interesting bulbs. Certainly no tulip can compete for brilliance with the exotic tigridia, also known as shell-flower and as Aztec-lily. Its three large petals come in shades of orange, red, pink, yellow, and white, and at the base of the petals is a flamboyantly spotted cup. The Aztecs cultivated the bulbs for food.

If tigridia has competition, it might come from the flame-red jacobean-lily *(Sprekelia formosissima),* cousin of the pot amaryllis. It flowers in spring in the Pedregal section and elsewhere in the mountainous zones of southcentral Mexico. It has six long, slender petals grouped in threes in an upper and lower arrangement.

The tuberose *(Polianthes tuberosa)* of Oaxaca emanates a gardenia sweetness so heavy that its lovely white or pinkish white spikes are banished by some from their indoor arrangements— the scent is too overpowering! Sweetly fragrant, but not too heavily, is the little white star *(Milla biflora)* of the Pedregal, circular bunches of which are sold by youngsters along the roadsides in July and August.

Mexican stars, *Milla biflora,* create a garden in the grotesque fields of gray lava known as the Pedregal, south of Mexico City.

Dr. Helia Bravo, famed Mexican cactologist, views trailing opuntia, *(O. stenopetala),* on a cliffside at the Canyon Toliman near Zimapan, Hidalgo. White rosettes are *Hechtia argentea.*

Upper right. Old man cactus, *Cephalocereus senilis,* march like stately, white sentinels up the slopes of the Barranca del Venado north of Pachuca, Hidalgo. Hidalgo is a cactus treasure trove.

Lower right. One of the many Mexican night-blooming cereus, *Nyctocereus serpentinus,* flowering in the author's garden at Tlalpam, D.F. *Nyctocereus* reaches ten feet or more.

Dahlias

And what larger tuberous plant is there than the dahlia? One *(D. imperialis),* actually of tree proportions, grows fifteen feet tall and in fall is covered with pale mauve-pink, yellow-centered blooms, a single flower sometimes measuring ten inches across. The tuber from which the plant springs to complete its total growth in a single season is immense. Tree dahlias are wild in Oaxaca. Other smaller dahlias, the ancestors of the garden hybrids, are scattered over the mountains of Mexico in orange, yellow, pink, red, and white. The orange and pink can be found in autumn in the Pedregal.

Hymenocallis, the lovely, white spider-lilies of the garden, grow wild in the mountains of Mexico. There are many species, including some with small-flowered umbels and others with flowers of large, but narrow, ribbon-like petals, also borne in umbels.

Mexico has several tuberous begonias, including the dainty *Begonia gracilis,* with spikes of yellow-centered, clear pink blooms. It grows in lava zones, including the Pedregal. There is also a tuberous begonia with pearl-colored blooms, in the lava along the new Cuernavaca highway. In addition, eleven fibrous and rhizomatous begonias, which are important cultivated species in northern window gardens, come from the jungles of Veracruz.

Then there is a host of small bulbs: oxalis in reds and pinks, crocus-like fairy-lilies *(Zephyranthes)* and rain-lilies *(Cooperia)* in white and pinks, mariposa-lilies *(Calochortus)* with nodding, hairy, yellow or purple blooms, and coral-drops *(Bessera elegans)*—for many the most beautiful of bulbous plants—with Chinese-red, pendent blooms in loose umbels. *B. elegans* is to be seen in the fall along the highway from just north of Taxco to beyond Chilpancingo.

Mexican water-lilies, included here because of their tuberous roots, are the sources of parent stock for many pool-garden hybrids. There are floating double yellow and double white *(Nymphaea mexicana)* varieties in both temperate and tropical lakes, and a semidouble, violet-blue *(N. elegans)* which rises several inches above the water in tropical lakes. Water-hyacinths *(Eichhornia crassipes),* pests in

many parts of the world where they have been introduced, are native to Mexico, covering acres of swamp or whole river sections with their daintily marked, pale blue flowers.

Cacti and Succulents

Few plants have blooms more compellingly beautiful than cacti. And few are structurally more fascinating, making them and the lands they inhabit perennially alluring.

Apart from the irrigated areas, most of northern Mexico is cactus land. And these plant curiosities occur in varying numbers in almost every other state of the Republic as well. There are even cactus species, including the colorful orchid cactus *(Epiphyllum),* which grow in the trees of the tropical jungles of Veracruz and Chiapas.

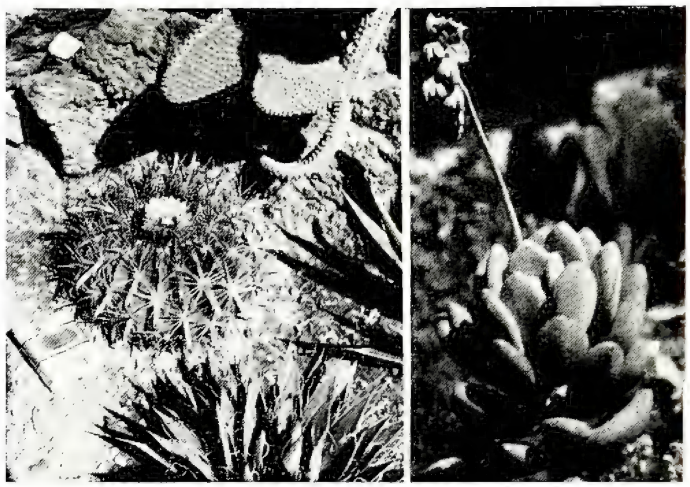
Mexico is home to more than half the hundreds of cactus species and to sixty-one of the one hundred and forty-three genera. There are the giant saguaros in Sonora and forests of candelabra cactus in the dry zones near Iguala on the Acapulco highway. There are fences of organ cactus *(Cephalocereus marginata)* in Hidalgo, and houses and walls covered with night-blooming cereus in both temperate and tropical Mexico.

Perhaps the most unusual of all this unusual family is the species known as old man *(Cephalocereus senilis)* because of its white, hairy spines. Hundreds of these stately columns march up the canyon-sides of the Barranca del Venado, north of Pachuca. Another hairy species stands in white-crowned dignity above the forest trees which cover the mountain-sides along the Oaxaca City-Tehuantepec highway.

Most Mexican dooryard gardens include a prickly pear *(Opuntia ficus-india)* or two. The fruits of these flat-pad cactus are edible; the young green shoots make a salad and a pickle. During droughts in northern zones, the thorns of other species of this widely prevalent cactus are burned off, and the pads used for forage for cattle, sheep, and goats.

But cacti are not the only plants that have adapted themselves to dry conditions. There are hundreds of other succulent plants with swollen leaves or stems for water storage. One of the most valuable of these is the century plant

Like most agaves, *A. atrovirens* flowers in eight to ten years, then dies, contradicting its name, century plant. *Maguey,* using the better Indian term, produces a yellow candelabra of bloom, twenty-five to thirty feet tall. The plant is the source of pulque, the Mexican beverage.



Ferocactus latispinus bears magenta flowers at its center. At right, *Pachyphytum oviferum* with deep red petals sheathed in green sepals.

(Agave) in nearly one hundred species, most of them Mexican. These are the plants from which pulque, tequila, and mezcal are made, and from which henequén rope and various coarse fabrics are manufactured.

There are hundreds of species of thick-leaved, ground-hugging sedums, of the hen-and-chickens form and the taller rosettes typical of the echeverias, including the large, bronzy-leaved burro's ear *(Echeveria gibbiflora),* the pachyphytums with globular leaves, and the swollen-trunked bottle-trees *(Nolina* and *Beaucarnea)* of Lower California and the desert of Iguala.

The Mexican people love these personable plants, and few adobe houses are without hanging tins of cacti and succulents. Two favorites are the pale green, hanging chains of *Sedum morganianum,* popularly called sheep's tail, and *Aporocactus flagelliformis,* descriptively named rat's tail, with bright magenta-pink blossoms.

Orchids, Bromeliads and Other Tree Dwellers

Mexico has long been an important port of call for the orchid hunter. With between six and eight hundred species scattered over the Republic, this is understandable. Richest zones for orchids are in the states of San Luis Potosi, Veracruz, Puebla, Mexico, Michoacán, Guerrero, Oaxaca, and Chiapas. The best altitude for them is about three thousand feet.

There is a furry, orange flower-spike which graces the pine meadows along the old highway to Cuernavaca in August. It is *Spiranthes aurantiaca.* The more heavily wooded section of the same highway hides other types of terrestrial orchids, similar to those in mountains north of Oaxaca City; and the Pedregal rock, as unlikely an orchid spot as one can imagine, has rocky basins thick with the pouchy, magenta *Bletia.*

But the epiphytic or tree-dwelling orchids are the most exciting. Of the eighty-two orchid genera in Mexico, there are many species with purple, yellow, or rose, often fragrant flowers. One can usually recognize the plants by their pseudobulbs, the swollen stem zones just below the leaves.

Because many orchids live in trees—don't mistakenly believe they live off trees. They use the trees only for support, not for food.

The same is true of the bromeliads, of which Mexico has

many hundreds, both growing in the ground and on trees. These are the plants that resemble pineapple tops (and the pineapple is a member of the Bromeliad Family) and have great tails of bloom either rising or trailing from the centers. Most magnificent of the bromeliads is the regal *Tillandsia imperialis,* with gracefully drooping rosettes of leaves and a shining red cone. This plant is used as a decoration in the traditional Mexican Christmas nativity scene, as are the gray strands of Spanish moss *(T. usneoides)*, a member of the same genus. Bromeliads are numerous in the tropical and temperate areas in which orchids abound.

Another tree dweller is the tropical philodendron, now riding a crest of popularity as a house plant because of its harmony with the modern interior and its ability to live in little sunlight. These, with their giant, often spear-shaped or perforated leaves, dangle on their ropelike stems from tree branches.

Mexico's plant world, of course, does include some true parasites, the most outstanding being the Mexican mistletoe *(Psittacanthus calyculatus)*. Its scarlet or orange blooms make the host trees appear aflame during August and September in tropical zones. A by-product of the Mexican mistletoe's parasitism is a gloriously twisted section of wood where the mistletoe "roots" entered its unfortunate host. Cleaned and polished, it makes a handsome "wood flower."

Another striking parasite is the castilleja group, relatives of the northern Indian paint-brush, one of which *(C. arvensis)* flaunts gaudy scarlet blooms on plants whose roots tap those of corn for food. Another *(C. canescens)*, common along mountain roads, is dull orange and resembles a small, twisted hand: because of this it is known in Spanish as *mano de muerto,* or hand of the dead.

Yes, for the plant enthusiast, Mexico has a treasure house to offer . . . with a treasure that lives!

CEANOTHUS (Continued from page 168)

degrees of intensity. It is unlike any recognized flower scent, and to my nose is the heavy sweetness of warm honey. *C. cordulatus, C. cuneatus,* and *C. griseus* all have penetrating perfume. The scent of bush-brush is especially powerful when it flowers against warm chaparral slopes.

The foliage in some species has a certain resinous or pungent scent; this seems more pronounced in species having papillate, or glandular leaf surfaces. On the field trips to local mountains where *C. papillosus* grows abundantly, the air is redolent with its bitter-sweet scent. The highly polished foliage of *C. velutinus* is said to have a strong cinnamon odor. These fragrances are rather elusive, and evident only when warmth and moisture of the air is exactly right.

Ceanothus is a fascinating genus of evergreen shrubs. The potential for new or "made-to-order" plants is only now being realized in this genus, in which a wide selection of types is already present.

SORBUS (Continued from page 165)

and drought-resistant. The dark green leaflets, whitish beneath, turn red in the fall. The large fruit cluster contains over one hundred white fruits on red pedicels, giving the plant a most unusual and effective appearance. In Boston *S. discolor* flowers in May.

The Service-Tree

The service-tree *(Sorbus domestica)* group is rare in American gardens. This group includes species with pinnate-compound leaves and large, pear-shaped, yellowish green fruits, measuring one inch in length and in width across the apical end. These fruits have an unusual acid flavor and are edible only when kept until "bletted," that is partially rotten—the skin black and the flesh soft and juicy.

The service-tree is native to the Mediterranean region, southern European and North African countries. There it is cultivated for the fruit which is used in making a cider-like drink, *cervisia* (beer), hence the name service-tree.

The seed of the service-tree is rich in oil and is the source of the service-berry oil *(Huile de sorbier sauvage*—French, *Vogelbeerenol*—German, and *Olie de sorba salvatica*—Italian) of commerce.

The White Beam-Tree

The white beam-tree type of *Sorbus* includes species with simple, cherry-like leaves, small flowers, and loose clusters of yellow or red fruits. These species are native to Europe and Asia. Many ornamental species have been introduced into American botanical gardens and arboretums; several very desirable ones, of great adaptability, are described here.

The white beam-tree *(S. aria)* from Europe grows well on chalk cliffs and other limestone soil. It has a broad-pyramidal crown and attains a height of forty-five feet. The handsome aspect of the plant, its bright green leaves, which are white-tomentose beneath, and its attractive orange-red or scarlet fruits, which are specked with brownish dots, have made it a favorite in European gardens for a long time. Some horticultural forms have been developed.

The alder-leaf beam-tree *(S. alnifolia)* is a native of central China, Korea, and Japan. It is one of the most decorative species introduced into American gardens. When young it has a pyramidal and upright habit but at maturity it assumes a rounded outline. Its dense, lustrous green foliage turns orange and scarlet in the fall. It is hardy in Boston.

Another favorite, introduced from central China, is the Folgner beam-tree *(S. folgneri)*. This species is of smaller stature, attaining a height of twenty-five feet in the vicinity of Boston. Some people prefer it to the alder-leaf beam-tree because of its gracefully arching and spreading branches. Its ovate leaves are white-woolly beneath, and they are especially attractive when tremulant in the wind.

A Precaution

The various species of the genus *Sorbus* are susceptible to the infection of borers which attack the trunk at above ground level. The problem of borers is more serious in the Atlantic States than on the Pacific Coast. A twelve per cent DDT spray, applied twice each year on the trunk, the first just before the hatching of the eggs and the second about three weeks later, will keep the borers under control. This spraying should be done between April and June. One can determine the exact schedule by consulting his local agricultural experimental station.

OCTOBER EVENTS AT THE GARDEN

September 6—October 6, 1963
Exhibit of grapes in variety, their uses as fruit, raisins, and wine, and methods of growing them. This exhibit is sponsored by The New York Botanical Garden and Wine Growers of California.

October 12, 13, 1963
Exhibit of Bonsai and a how-to-grow display, sponsored by The New York Botanical Garden and the Bonsai Society of Greater New York.

Also, at three o'clock on Saturday, the 12th, lecture on the "Art of Bonsai" by Yuji Yoshimura in the Lecture Hall of the Museum and Administration Building.

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

YOUNGER READERS

A BEE IS BORN. Doering, Harald. Translated and adapted by Dale S. Cunningham. 96 pages, illustrated. (Sterling Nature Series) Sterling Publishing Co., New York. 1962. $2.50.

One hundred remarkable photographs (many of which are magnified) of the life cycle and activities of the fastidious and industrious honeybee, accompanied by a text which is simple enough for young children to understand and fascinating for all ages.

DESERT BEAUTY: THE STORY OF CACTI. Jeanes, Charlotte and Joseph Stacey. 32 pages, colored illustrations. (A Nature-Adventure Book) Follett Publishing Co., Chicago. 1962. $1.95.

Gorgeous colored illustrations taken from *Arizona Highways Magazine* with a readable text which should appeal to young readers.

THE GOLDEN ADVENTURE KIT OF LEAVES with THE ADVENTURE BOOK OF LEAVES. Howard, Charlotte. 95 pages, illustrated, indexed. Golden Press, New York. 1962. $3.99.

Collecting leaves can be as exciting as stamp collecting, when one has the materials for making leaf prints and an album in which to arrange and keep them. In this kit are bottles of different colored inks, brushes, leaf printing paper, tweezers, casting plaster, and a most helpful illustrated guide book to aid the youngster in learning to identify his leaves and to know something about the characteristics and uses of some sixty different kinds of trees.

LEAVES, Caulfield, Peggy. 72 pages, illustrated, Coward-McCann, New York. 1962. $2.75.

These charming photographs and simple text will open up new vistas to young inquiring readers, who will discover numerous fascinating forms and functions of many kinds of leaves.

LIFE IN THE FOREST. Snedigar, Robert. unpaged, illustrated (part colored). (A True-to-Life Book) Meredith Press, Des Moines, Ia. 1962. $1.00.

A superbly illustrated nature book of animals and plants with a wonderfully written simple text. The photographs in color are based on the motion picture "Life in the Forest," produced by Encyclopedia Britannica Films, Inc. The publishers state: "this book has been carefully manufactured for long wear . . . the laminated cover resists dirt and is washable."

PIONEER GERM FIGHTERS. Sullivan, Navin. 164 pages, illustrated, bibliography. Atheneum Publishers, New York. 1962. $3.75.

Stirring accounts of research written for those in their early teens. Inspired by the monumental discoveries of Leeuwenhoek, Jenner, Koch, Pasteur, Beijerinck, Ehrlich, Fleming, Goodpasture, Stanley, Enders, and Salk.

THE QUESTION AND ANSWER BOOK OF NATURE. Saunders, John R. 61 pages, illustrated (part colored), indexed. Random House, New York. 1962. $1.95.

"Why do we put plants in a fish tank?" "Will seeds grow after being kept for years?" "What is the difference between a fruit and a vegetable?" "Why isn't a mushroom green like other plants?" These are sample plant questions, but there are equally fascinating quizzes about animals, rocks, minerals, the sky, the weather, and the soil. An answer follows each question. Attractively illustrated in color.

RUBBER BOY. Mauzey, Merritt. 60 pages, illustrated. Abelard-Schuman, New York. 1962. $3.00.

The story of rubber told through the life of a Malayan boy who was born and reared on a rubber plantation, studied the chemistry of rubber at his local university, worked as an extension assistant among the "smallholder" rubber planters, and later was sent on a world tour to visit rubber plantations in the Philippine Islands, Costa Rica and Liberia and rubber factories in the United States. Finally, he traveled to South America and saw the original Amazonian home of the rubber plant. For pre-teen youngsters.

THE STORY OF LIFE: PLANTS AND ANIMALS THROUGH THE AGES. Farb, Peter. 126 pages, illustrated (part colored), bibliography, indexed. (A Story of Science Series Book for Young People) Harvey House, Irvington-on-Hudson, N. Y. 1962. $3.50.

A stimulating, splendidly illustrated introduction to the study of fossil flora and fauna, with a lengthy list of museums in the United States and Canada that have good fossil collections.

THE STORY OF LUMBER. Floethe, Louise L. and Richard. 31 pages, colored illustrations. Charles Scribner's Sons, New York. 1962. $3.25.

A story-picture book, for very young readers, of lumber—from the felling of the trees in the forest to the shipping of the boards from the sawmill.

SEEDS BY WIND AND WATER. Jordan, Helene J. unpaged, illustrated by Nils Hogner. (Let's Read-And-Find-Out Science Book) Thomas Y. Crowell Co., New York. 1962. $2.50.

The numerous ways in which seeds are carried from place to place are described and pictured for the very young reader. Helene Jordan, an associate editor of *Natural History*, is the author of another delightful easy-to-read picture book, entitled *How a Seed Grows* (1960).

STRANGE WORLDS UNDER A MICROSCOPE. Cosgrove, Margaret. 138 pages, illustrated, indexed. Dodd, Mead and Co., New York. 1962. $3.25.

A stimulating introduction, for teen-agers, to the study of elementary microtechnique, and to the history and use of the microscope. Glimpses into the fantastic, invisible-to-the-naked-eye worlds of plants, animals, and minerals, with many experiments for home and school laboratories.

STRANGE PLANTS AND ANIMALS. Bressler, Martin. 127 pages, colored illustrations. (Fact and Fun Activity Books) Harvey House, Irvington-on-Hudson, N. Y. 1962. Paper, $1.00.

A nature-fun book with the greatest assortment of things to do and read—crossword puzzles, coloring games, word games, Edward Lear's nonsense botany, strange facts, riddles and limericks—for those between six and ten years of age.

THE TALE OF A WOOD. Kane, Henry B. 119 pages, illustrated, indexed. Alfred A. Knopf, New York. 1962. $3.00.

Those who have enjoyed Henry Kane's *The Tale of a Pond* and *The Tale of a Meadow* have another equally fine treat with his latest title. His photographs, drawings, and text have a perfection which will appeal to readers, old and young.

THE WIND HAS SCRATCHY FINGERS. Clifford Eth and Raymond Carlson. 32 pages, colored illustrations. Follett Publishing Co., Chicago. 1962. $1.95.

A dramatic story of wind erosion in our great Southwest, with stirring full-color photographs from *Arizona Highways*.

TREES AND HOW THEY GROW. Carter, Katharine. 59 pages, colored illustrations. (Whitman Learn About Book Series) Whitman Publishing Co., 1961. $.59.

Another fine picture-story book for very young readers, with informative, accurate, and simple text.

THE FIRST MICROSCOPE. Dareff, Hal. unpaged, colored illustrations. (Great Events Book) Parents' Magazine Press, New York. 1962. $1.00.

A story-book history of the early days of the microscope and of a few of the discoveries of Leeuenhoek, Pasteur, Robert Koch, Walter Reed, Paul Ehrlich, and other microbe hunters. This was checked for technical accuracy by Dr. Francis J. Ryan, Chairman of the Zoology Department, Columbia University. For grade-school readers.

UNDER THE TREES AND THROUGH THE GRASS. Tresselt, Alvin. unpaged, colored illustrations. Lothrop, Lee and Shepard, New York. 1962. $2.95.

For the very, very young—a picture story book about a little boy who meets for the first time some of the animals who live in the woods and streams.

WORLD PROVIDER: THE STORY OF GRASS. Riedman, Sarah R. 191 pages, illustrated, indexed. Abelard-Schuman, New York. 1962. $3.40.

Dr. Riedman, who received her doctorate degree from Columbia University, has written this excellent account of many of the members of the grass family—botanical descriptions, methods of cultivation, processing, uses, and importance. A most readable, informative text for all ages.

YOUR SCIENCE FAIR: AN OPPORTUNITY FOR YOUTH; A GUIDEBOOK TO SUCCESSFUL SCIENCE EXHIBITS. Welte, Arden F., James

Diamond and Alfred Friedl. 161 pages, illustrated, bibliography. Burgess Publishing Co., Minneapolis. 1962. Paper, $2.95.

There is a great need for a guide of this kind. Here at The New York Botanical Garden we have numerous requests from high school students and from their teachers for ideas for science displays and science fairs. This book, written by high school teachers who have had considerable experience in this field of science education, will be a most helpful reference manual.

GENERAL GARDENING

THE JOY OF A SMALL GARDEN. Gillespie, Janet. 216 pages, illustrated, indexed. Dodd, Mead and Co., New York. 1963. $3.75.

Here is a breezy, frequently amusing, ever informative account of a modest garden in southern New Hampshire by the mother of four, who had little spare money or time to spend on plants. This would make a fine gift book for one just beginning to garden.

THE OXFORD BOOK OF GARDEN FLOWERS. Nicholson, B. E., and others. 207 pages, colored illustrations, indexed. Oxford University Press, New York. 1963. $8.00.

There is a pleasing quality to the color reproductions of the five-hundred-odd garden plants which are illustrated in this companion volume to *The Oxford Book of Wild Flowers* (Oxford University Press, 1960). Whereas the earlier published title was more concerned with the identification of the wild-flower subjects, the text of the present volume contains cultural notes and names of recommended varieties. The general arrangement is according to season of bloom, with the last pages devoted to a section on miniature gardens and listings of plants suitable for special soils, situations, and uses.

A PICTURE DICTIONARY FOR THE HOME GARDENER. Grabe, Andrée Vilas. 168 pages, photographs, indexed. Hill and Wang, New York. 1963. $4.95.

A concise handbook of plant materials (annuals, biennials, perennials, shrubs, vines, and trees) and of "short-cut" cultural notes for the beginning gardener by the author of the excellent manual *Complete Book of House Plants* (Random House, 1958). This dictionary contains critical and descriptive notes on over eight hundred fifty plants, with 276 photographs of plants and gardening operations.

SUNSET BASIC GARDENING ILLUSTRATED. Editors of Sunset Books and Sunset Magazine. 128 pages, illustrated, indexed. Lane Book Co., Menlo Park, Cal. 1963. Paper, $1.95.

The Sunset paper-covered, inexpensive, visual handbooks continue to give high-level information presented with a simply written text, generously illustrated with useful diagrams and photographs. *Sunset Basic Gardening Illustrated*, containing 925 drawings and photographs, offers how-to-do-it gardening fundamentals, including the culture of flowers, vegetables, fruits, trees, shrubs, vines, and lawns.

HORTICULTURE

ADVANCES IN HORTICULTURAL SCIENCE AND THEIR APPLICATIONS: PROCEEDINGS OF THE FIFTEENTH INTERNATIONAL HORTICULTURAL CONGRESS, NICE, 1958. 3 Vols. Garnaud, Jean-Claude, ed. 546, 527, 578 pages, illustrated, bibliographies, indexed. (Pergamon Press) The Macmillan Co., New York. 1961-1962. Set of 3 Vols.. $60.00.

The theme of the Fifteenth International Congress was "Science to the Service of Horticulture," with emphasis placed on the practical results of scientific research. Over two hundred papers were presented in English, French, and German, under these general headings: New Growth and Flower-Inducing Substances; New Data on Fruit Maturation; Soilless Culture and Nutrient Misting; Diagnosis and Control of Virus Diseases; Problems in Mineral Nutrition; Use of Plastics in Horticulture; Heterosis and Breeding in Horticultural Plants; Vegetable and Seed Stock Growing; Fruit Growing; Flower Growing; Mediterranean and Subtropical Plant Growing; Plant Pathology and Disease Control; Modern Techniques and Productivity in Horticulture; Greenhouses; and Horticultural Climatology.

EXPERIMENTAL HORTICULTURE. No. 8. Great Britain. Ministry of Agriculture, Fisheries and Food. 116 pages, illustrated, bibliographies. British Information Services, New York. 1963. Paper, $1.40.

Eighteen papers on recent findings deal with horticultural research in Great Britain. Contents include: Tomato Growing; Apple Mildew; Gooseberries; Strawberries; Size for Early Potato Seed; Runner Bean Varieties; Hot-Water Treatment of Narcissus Bulbs; Chrysanthemums; Cyclamen; Polyanthus; and Gerbera Botrytis.

HORTICULTURAL SCIENCE. Janick, Jules. 472 pages, illustrated, bbliographies, indexed. (A Series of Books in Agricultural Science) W. H. Freeman and Co., San Francisco. 1963. $8.50.

Fundamental principles rather than practical applications of horticulture form the framework of this stimulating, modern-looking textbook, written primarily for first-year horticultural university students by Professor Janick of Purdue University, with Chapter II, "The Classification of Horticultural Plants," by Dr. Arthur H. Westing and Chapter V, "Plant Development," by Dr. Charles E. Hess, both of Purdue. The numerous diagrams and explanatory captions add greatly to the usefulness and attractiveness of this excellent work.

SPECIAL GROUPS OF PLANTS

ENCYCLOPEDIA OF ROSES IN NATURAL COLOR. Edland, Henry. 175 pages, colored illustrations, indexed. St. Martin's Press, New York. 1963. $4.95 until Dec. 25th 1963; thereafter $6.00.

Over four hundred varieties of roses are described and illustrated in color. The useful tabulations are based on predominant color, fragrance, hardiness, size of bloom, recurrence of flowering, and height. Format, color reproduction, and contents are excellent.

HANDBOOK OF WILD FLOWER CULTIVATION. Taylor, Kathryn, and Stephen F. Hamblin. 307 pages, illustrated, bibliography, indexed. The Macmillan Co., New York. 1963. $5.95.

Two well-known horticulturists have written this very practical guide to wild flower growing and propagation. It contains descriptive and cultural notes on over four hundred and fifty native plants; also lists of plants suitable for specific conditions (such as seashore, bog, lime-loving, acid-loving) a glossary of botanical terms, and the names of dealers of native plants and seeds. Not included are ferns, fern allies, grasses, rushes, and sedges except in the subject tabulations.

THE MOUTAN OR TREE PEONY. Haworth-Booth, Michael. 106 pages, illustrated, bibliography. St. Martin's Press, New York. 1963. $3.95.

This excellent little book by one of England's great plantsmen is dedicated to Silvia Saunders "in appreciation of her great work for the Tree Peonies, carrying on that of her father, the late A. P. Saunders." Mr. Haworth-Booth, well known in this country and abroad for his *The Hydrangeas* (3rd ed., Constable, 1959) has again produced an important monograph on the subject of tree peonies. Among his American fellow-horticulturists to whom he pays tribute is Henry F. du Pont, who took over to the Chelsea Flower Show in 1962 a collection of American varieties of tree peonies, which was awarded the Lindley Silver Medal by the Royal Horticultural Society.

USING PLANTS FOR HEALING: AN AMERICAN HERBAL. Coon, Nelson. 272 pages, illustrated, bibliography, indexed. Hearthside Press, New York. 1963. $4.95.

The author of the very popular *Using Wayside Plants* (Hearthside Press, 1960) was persuaded by many of his readers to write another book which would be devoted entirely to American plant remedies. According to Mr. Coon, his greatest difficulty was limiting the number of plants which could be crowded into the present volume. He selected 175 because of their widespread use, and then later added another chapter with seventy-five less known species. The finished work abounds in fascinating information about plants used by the American Indians, by the early Colonists, and by our "old-fashioned" grandmothers. The scientifically accurate text is permeated with humor and nostalgic memories.

THE WONDERFUL WORLD OF BULBS. Miles, Bebe. 348 pages, illustrated (part colored), bibliography, indexed. D. Van Nostrand Co., Princeton, N. J. 1963. $7.50.

Bebe Miles, who is an experienced and enthusiastic grower of bulbs, is convinced that "bulbs will endure more neglect than almost anything else you put in your garden." She has written a comprehensive, well-organized book on the culture of a wide variety of bulbous plants (including corms, tubers, and rhizomes). Although she has devoted more space to the hardy kinds, there are good chapters on tender summer bulbs, forcing bulbs for early spring bloom, and bulbs suitable for house plants. Her list of recommended commercial retail sources for bulbs is especially useful.

TREES AND SHRUBS

THE CONCISE ENCYCLOPEDIA OF FAVORITE FLOWERING SHRUBS: A HUNDRED FLOWERING SHRUBS SELECTED FOR CONTEMPORARY

HOME GARDEN PLANTING. Dietz, Marjorie J. 316 pages, illustrated (colored frontispiece). Doubleday and Co., New York. 1963. $4.95.

In this handy, ready-reference guide the gardener can quickly locate specific information. The uniformity of the arrangement of the data and the clarity of the notes are good features. Included are common and scientific names, pronunciation guides, descriptive, cultural, and critical information. This title is a companion volume to *The Concise Encyclopedia of Favorite Flowers* (Doubleday and Co., 1953), edited by Montague Free.

FLOWERING TREES. Clark, Robert B. 241 pages, illustrated (part colored), indexed. D. Van Nostrand Co., Princeton, N. J. 1963. $6.50.

The Senior Curator of the Liberty Hyde Bailey Hortorium, and former Assistant Director of the Bayard Cutting Arboretum, offers a very useful volume on the selection and maintenance of small to moderate-height deciduous trees which are valued for their flowers and often for their attractive fruit. Fragrance, good form, and interesting foliage (especially autumn coloration) are other desirable qualities which are stressed. Numerous lists and tabulations, with information pertinent to specific needs and situations, are to be found in the nine appendices which follow the main text. Particularly useful is the list of public and private gardens which have good collections of flowering trees.

THE SHRUB IDENTIFICATION BOOK: THE VISUAL METHOD FOR THE PRACTICAL IDENTIFICATION OF SHRUBS, INCLUDING WOODY VINES AND GROUND COVERS. Symonds, George W. D. 379 pages, photographs, bibliography, indexed. M. Barrows and Co., New York. 1963. $15.00.

A welcome companion title to the author's *The Tree Identification Book* (Barrows, 1958) which has enjoyed a tremendous reception from amateur botanists who have found that pictured keys often furnish easy solutions to perplexing identification problems. The 3,550 photographs in *The Shrub Identification Book* are the work of A. W. Merwin of Wilton, Connecticut, and cover some two hundred species and varieties of native and introduced shrubs which grow in northeastern United States and Canada.

SHRUBS AND TREES FOR THE HOME LANDSCAPE. Bush-Brown, James. 210 pages, illustrated, indexed. Chilton Books, Philadelphia. 1963. $5.95.

The name of Bush-Brown is familiar to those who have had the privilege of attending classes in horticulture and landscape design with Mr. and Mrs. Bush-Brown as inspiring teachers. This very useful book by Mr. Bush-Brown has many excellent features: the photographs, for the most part, are clear, full-length habitat shots; about a quarter of the main text is devoted to general cultural information with brief notes on planting design; in the section "Shrubs and Small Trees of Merit," specific notes relating to each plant are tabulated, such as zone of hardiness, soil and exposure preference, cultural comments, and brief historical data. Especially useful is the list entitled "North American Plants Brought into Cultivation during the 17th and the 18th Centuries."

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HOUSE PLANTS

1001 HOUSE PLANT QUESTIONS ANSWERED. Schuler, Stanley. 278 pages, illustrated, indexed. D. Van Nostrand and Co., Princeton, N. J. 1963. $5.95.

The question-and-answer kind of gardening book appeals particularly to those who have had little or no experience in growing plants. The author has arranged the questions in the first part of the book under general headings, such as soil, watering, fertilizers, bulb forcing, terrariums and dish gardens. In the second part, "specific plant" questions are to be found under the names of the plants which follow an alphabetical sequence from abelia to zephyr lilies. In the final section are numerous lists under "Where to Grow"—example, Plants for North Windows; "What to Grow"—example, Fine Foliage Plants; and "Where to Buy"—example, Commercial Sources. This book itself is the perfect answer to the ever recurring question: "What is a good book on house plants?"

FLOWER ARRANGEMENT

THE ART OF FLOWER ARRANGEMENT IN HAWAII. Peterson, Caroline E., and Kenneth Kingrey. 102 pages, illustrated (part colored). University of Hawaii Press, Honolulu. 1962. $15.00.

Many who have visited Hawaii remember vividly the exquisite flower arrangements at the Honolulu Academy of Arts. For more than twenty-five years these creations have been the work of one woman, Mrs. Caroline E. Peterson. *The Art of Flower Arrangement in Hawaii* reflects the fine talents of two artists—in the forty-eight photographic reproductions (twenty-three in color) of Mrs. Peterson's superb arrangements and in the inspiring and informative text of teacher-designer-artist Kenneth Kingrey.

FLOWER ARRANGEMENTS THROUGH THE YEAR. Roberts, Patricia Easterbrook. 95 pages, illustrated (part colored). (A Studio Book) The Viking Press, New York. 1963. $5.95.

Mrs. Roberts has added another title to her list of practical books on floral decoration and table arrangement. Her latest offering follows a chronological sequence, with suggestions for fascinating flower combinations which are especially appropriate for the month in question. It is a most helpful, well-illustrated guide which will appeal to the hostess who is seeking new ideas with which to impress her family and guests.

JAPANESE FLOWER ARRANGEMENT: A COMPLETE PRIMER. Allen, Ellen G. 86 pages, illustrated, indexed. Charles E. Tuttle Co., Rutland, Vt. 1963. $2.75.

The first edition of this little book was published in 1952 under the title *Japanese Flower Arrangement in a Nutshell.* In this revised edition, the author has again included the methods of the Ohara School for the Moribana and Heika (Nagiere) and of the Saga School for the Seika Style and, in addition, has discussed briefly some features which are applicable to western use from the Sogetsu, the Ikenobo, the Sho-fu-ryu, and other famous schools in Japan.

(Continued on page 196)

NEWS, NOTES and COMMENTS

Reception for the Graduates in the Two-Year Course in Botany and the Two-Year Course in Practical Gardening was held at the Garden on June 19, 1963. Mrs. Lillian Weber, Botanical Instructor, welcomed the graduates, their relatives and friends. T. H. Everett, Associate Director (Horticulture) and Senior Curator of Education, spoke on "Plants and Gardens of Tropical Asia."

Sherman Baldwin, a member of the Board of Managers of The New York Botanical Garden, presented certificates to: (Two-year Course in Botany) Joseph F. Billone, Bronx, N. Y., Mae C. Foss, Katonah, N. Y., Harold Ginsburg, New York City, Susan Hybarger, New York City, Elesa Karnofsky, Larchmont, N. Y., Helen McKown, Katonah, N. Y., Genevieve B. Perri, Scarsdale, N. Y., Mary E. Wheeler, Wilton, Conn., Janeth Beth Wunder and Stephanie Louisa Wunder, Bronx, N. Y.; (Two-Year Course in Practical Gardening) Charles Rogers Batchelor, Dr., New York City, Jean Bogen, Flushing, N. Y., Dorise du Mouchel, Bronx, N. Y., Hetty Everett, Bronx, N. Y., Lisa Forte Galizia, Bronx, N. Y., Paul Goluboff, Bronx, N. Y., Myra Hecht, New Rochelle, N. Y., Lillian Johnston, Jackson Heights, N. Y., Kay Karmel, Mamaroneck, N. Y., Audry C. Kennedy, Bronx, N. Y., Joseph Miranda, Bronx, N. Y., Eileen Nemoitin, Stamford, Conn., Walter Nowak, Yonkers, N. Y., Francis C. Rees, East Norwalk, Conn., Salvatore Rotondo, Long Island City, N. Y., Nicholas F. Santora, Yonkers, N. Y., Helen Scheiner, Bronx, N. Y., and Katherine T. Schmidt, Katonah, N. Y.

Municipal Cooperative Educational Program. The New York Botanical Garden and Christopher Columbus High School in the Bronx will cooperate in a program to provide a reservoir of young men for landscaping and allied jobs. Starting September 9, 1963, this pilot project in the sciences will provide on-the-job training for thirty boys in their junior year, with one week spent at school, the next at the Garden. In addition to their regular high school subjects, they will receive instruction in botany, horticultural science, soil, and kindred topics.

Sherman Baldwin, a member of the Board of Managers of The New York Botanical Garden, presents a certificate to Hetty Everett for having satisfactorily completed the Two-Year Course in Practical Gardening, while Lillian Weber, Botanical Instructor, smiles her approval. Miss Everett is a member of the Garden's Educational Department.

This project between The New York Botanical Garden and Christopher Columbus High School is part of the Municipal Cooperative Educational Program of the Board of Education of the City of New York being carried on in thirty-seven high schools, and involving forty-two hundred students and over two hundred firms. It is reported that ninety-eight per cent complete their high school course, and eighty to eighty-five per cent obtain full-time jobs with those firms engaged in on-the-job training.

United States Wild Flower Series. The five-volume series on the wild flowers of the United States will be under the direction of Dr. William C. Steere as General Editor and Dr. Harold William Rickett as Senior Botanist. They will be assisted by Charles C. Johnson, professional free-lance photographer, who collaborated with Robert S. Lemmon in *Wild Flowers of North America*; Rachel Speiser, artist-illustrator, who worked at The New York Botanical Garden for some years with the late Dr. B. O. Dodge and has since been engaged in textile design; and Dorothy M. Langguth, secretary.

Dr. P. P. Pirone, Senior Plant Pathologist, acted as host to twenty-five members of the Long Island Arborists Association when they visited The New York Botanical Garden in July. Dr. Pirone was assisted by John Swan, Foreman of the Arboretum. Dr. Pirone was visited by Dr. Thomas Van Der Zwet, Plant Pathologist in charge of the Tung Research Laboratory of the United States Department of Agriculture at Bogalusa, Louisiana, and by Dr. Richard W. Harris of the Department of Landscape Horticulture, University of California at Davis.

Dr. Herman F. Becker will spend the coming academic year in the Department of Botany, University of Michigan at Ann Arbor. His status will be that of Visiting Associate Professor. Dr. Becker will spend four hours weekly in teaching a course on "Plants and Man Today"; the remainder of the week will be devoted to research in paleobotany. He expects to return to The New York Botanical Garden in September, 1964, as Research Associate, completing his research there on paleobotany under a terminal grant from the National Science Foundation.

Dorothy Ebel Hansell, Editor of *The Garden Journal,* has been appointed a member of the Special Awards Committee of the Horticultural Society of New York by the President of the Society, Charles Webster; and a member of the Committee on Arrangements for the 1964 American Horticultural Congress, to be held in New York in October, with a day at the Garden, by Dr. Henry T. Skinner, President of the American Horticultural Society. In August Mrs. Hansell served on the panel appointed by the New York Housing Authority to judge gardens in project developments. This month she will be a judge at the flower shows of the Royal Globe Insurance Group, the American Dahlia Society, the North Jersey Dahlia Society, and Grange 181, Passaic Township, N. J.

Garden Club of Orange and Dutchess Counties, New York, to mark the fiftieth anniversary of The Garden Club of America, published in a deluxe edition the writings of June Colden, America's first woman botanist.

Mrs. B. Elizabeth Wunder of Bronx, New York, and her daughters, Janet Beth and Stephanie Louisa, all graduates of the Two-Year Course in Botany. Mrs. Wunder received her certificate several years ago, Janet and Stephanie their certificates at the graduation exercises on June 19, 1963. Both are students at Bronx High School of Science. They participated in the Children's Gardencraft classes and in the Chrysanthemum Arrangement Competition formerly sponsored by the Garden annually in October in cooperation with the School Garden Association of the Board of Education of the City of New York.

The biographical chapter on Jane Colden is by Elizabeth C. Hall, the scientific evaluation of her work is by Dr. Harold William Rickett, both of the staff of The New York Botanical Garden in the Bronx.

The book, a limited edition, is available for $10 from P. O. Box 389, Newburgh, N. Y. Proceeds from the sales will be used for the project to grow native plants (described in the manuscript) at Knox's Headquarters, a Revolutionary War monument of New York State.

Dr. Henry T. Skinner, Director of the United States National Arboretum at Washington, D. C., since 1952, and President of the American Horticultural Society, received the Arthur Hoyt Scott Garden and Horticultural Award at the ninetieth commencement exercises of Swarthmore College this past June. The Award, which is given every two or three years, consists of a medal and a gift of $1,000.

Dr. Skinner, who was born in England, studied at the Wisley School of the Royal Horticultural Society before coming to this country in 1927 to work at the Arnold Arboretum, Jamaica Plains, Massachusetts. In 1931 he went to Cornell University, where he instructed in ornamental horticulture while completing undergraduate and graduate degrees. In 1941 he became curator of the Morris Arboretum of the University of Pennsylvania in Chestnut Hill and, during his eleven-year curatorship, earned his doctorate at the University. In research for his thesis on native azaleas of the eastern and central parts of the United States, he covered twenty-five thousand miles between March and August, 1951.

The Scott Award was established thirty-four

years ago by Mr. and Mrs. Owen Moon, Jr., in memory of Arthur Hoyt Scott, an outstanding amateur gardener and alumnus of Swarthmore College. In his memory the Scott Horticultural Foundation was founded on the Swarthmore campus.

Robert W. Dowling, President of Sterling Forest Gardens near Tuxedo Park, New York, and Peter D. Tryforos, President of the New York Florist Club, have been appointed to the Board of Directors of the International Flower Show, according to George C. White, Chairman of the Board. The forty-seventh International Flower Show will be held in the Coliseum, New York City, March 7-15, 1964.

Prof. Frans Verdoorn has received a medal for the establishment and development of the new Biohistorical Institute of the University of Utrecht, in which the former *Chronica Botanica* library and archives have been incorporated. The medal was one of three presented on the occasion of the fiftieth anniversary meeting of The Netherlands Society for the History of Medicine and Science. The two other recipients were Dr. E. D. Baumann for his writings on the history of medicine and Dr. Marla Rooseboom, a long-time council member of the Society, for her work in developing the National Museum of the History of Science at Leyden.

United States Plant Scientists will collect wild plants in the Soviet Union, according to an announcement made by Orville Freeman, Secretary of Agriculture, before his departure in July for an eighteen-day stay in the U.S.S.R. Drs. John L. Creech and Donald H. Scott of the Agricultural Research Service, United States Department of Agriculture, at Beltsville, Maryland, were chosen to spend sixty days in the Alma Ata region to search for germ plasm of horticultural plants.

Secretary Freeman stated that the United States has sought such an exchange for several years because many varieties of plants grown in America originated in Russia. He is hopeful that the U. S. scientists will discover useful varieties as well as biological enemies of some of the pests and diseases which plague American plants.

The Soviet Union is expected to send two grain sorghum specialists to the United States for thirty days, and possibly two other agricultural specialists for another thirty days, in exchange.

Park's Floral Magazine, which was published by Park Seed Co., from 1871 until 1926 when George W. Park retired, will be published again. The magazine will reappear in 1964, edited by Elvin McDonald. Kathleen Bourke will be responsible for the art and Larry B. Nicholson, Jr., for the photography. Park Seed Co. was originally located in Pennsylvania; it is now in Greenwood, South Carolina.

National Science Foundation has granted to The New York Botanical Garden the sum of $31,600 for support of the publication of an "Atlas of North American Astragalus" under the direction of Rupert C. Barneby, Honorary Curator of Western American Alpines.

Dr. David J. Rogers, Curator of Quantitative Taxonomy, escorts Mrs. C. D. Deshmukh through the Conservatory. Rear, Dr. Pierre Dansereau, Assistant Director (Botany), discusses matters of mutual interest with Dr. Deshmukh, who is Vice Chancellor of the University of Delhi and Advocate of the Supreme Court of India. Dr. and Mrs. Deshmukh visited The New York Botanical Garden in July, 1963.

Dr. Dansereau, Dr. and Mrs. Deshmukh, and Dr. Rogers pause, in their tour of the Museum and Administration Building, before one of the specially built, large-sized Wardian cases filled with orchids and other tropical flowers.

BRIEF NOTES ON BOOKS (Cont. from pg. 194)

MINIATURE FLOWER ARRANGEMENTS AND PLANTINGS. Wilson, Lois. 181 pages, illustrated (part colored), bibliography, indexed. D. Van Nostrand Co., Princeton, N. J. 1963. $6.50.

The range and scope of this comprehensive work on miniature plants, plantings, and flower arrangements is extensive. The author, who has made an intensive study of this fascinating facet of floriculture, first presents a historical survey beginning with the Egyptians—some four thousand years ago. Then follow discussions and instructions in the practical applications and uses of miniature plants which include bonsai, Japanese tray gardens, modern arrangements and containers, and lists of varieties of miniature geraniums and roses. A useful feature is the list of nurserymen with indications of their specialities.

NATURE, ART AND FLOWER ARRANGEMENT. Cyphers, Emma Hodkinson. 160 pages, illustrated, indexed. Hearthside Press, New York. 1963. $4.95.

Here is a new challenging book on an old subject by a veteran writer of flower arrangement titles. This time Mrs. Cyphers has presented her readers with a stimulating refresher course in art appreciation, in which she shows the close relationship of outstanding examples of architecture, sculpture, and painting to objects in nature. She urges the ambitious flower arranger to become inspired through a close observation of nature's laws and forms. The book is well written and generously illustrated with striking photographs.

POLYGLOT DICTIONARY

DICTIONARY OF AGRICULTURE: GERMAN/ENGLISH/FRENCH/SPANISH, 2nd ed. Haensch, Günther, and Gisela Haberkamp, comps. 744 pages. Elsevier Publishing Co., New York. 1963. $19.50.

The number of entries in this excellent polyglottic dictionary of agricultural terms and names of plants has been extended to 10,057, an increase of about twenty-five per cent. An important basic reference work.

FORESTRY

CONCEPTS OF FOREST ENTOMOLOGY. Graham, Kenneth. 388 pages, illustrated, bibliography, indexed. (Reinhold Books in the Biological Sciences) Reinhold Publishing Co., New York. 1963. $9.50.

The author of this technical treatise, who is Professor of Forest Entomology of the Faculty of Forestry at The University of British Columbia, clearly states that the purpose of this work is the setting forth of some of the principles of forest entomology which are involved in the *protection* of forests from insects. His text is not dominated by the taxonomy of the organisms nor by the appearance of the trees that have been attacked. Chapter headings include: The Scope of Forest Entomology; Characteristics of Insects and Resources of Environment; Detection and Identification; Biological Evaluation; Population Phenomena and Their Analysis; Applied Control; References.

LANDSCAPE GARDENING

BETTER HOMES AND GARDENS LANDSCAPE PLANNING. Editors of Better Homes and Gardens. 192 pages, illustrated (part colored), indexed. Meredith Publishing Co., Des Moines, Ia. 1963. $3.95.

A useful visual guide for the planning and redoing of modest-sized gardens, prepared by the editors of one of America's most widely read family magazines, with the advisory assistance of Eugene Martini, who is an executive member of The American Society of Landscape Architects. In the lists of recommended plants attention is given to the limitations of four climatic sections of the country—Central, Southern, Eastern, and Western—with hardiness zone figures given under each region.

A HISTORY OF GARDEN DESIGN. Clifford, Derek. 232 pages, photographs, bibliography, indexed. Frederick A. Praeger, New York. 1963. $13.75.

A scholarly and most readable account of noteworthy gardens and designers of gardens from the time of Amenhotep of Thebes (circa 1400 B. C.) to the present day. A truly fine contribution to the literature of landscape gardening.

HOW TO BUILD DECKS FOR OUTDOOR LIVING. Editors of Sunset Books and Sunset Magazine. 96 pages, illustrated, indexed. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1963. Paper, $1.95.

A newcomer to many in the field of architecture and landscape design is the "deck," which has become popular with "outdoor living" enthusiasts. This booklet presents excellent construction details and offers useful planting suggestions.

IMAGINATIVE SMALL GARDENS. Grasby, Nancy. 256 pages, illustrated, bibliography, indexed. Hearthside Press, New York. 1963. $4.95.

Mrs. Grasby, who holds a degree in landscape architecture and who has spent over twenty years in New York City, writes with an intelligent understanding of the problems of the city and suburban small property owner. Her book is well illustrated with photographs, diagrams, and planting plans (drawn to scale).

LADIES' HOME JOURNAL BOOK OF LANDSCAPING AND OUTDOOR LIVING: THE HOMESCAPER'S GUIDE TO GOOD LOOKS AND GOOD LIVING ON HIS GROUNDS. Pratt, Richard. 225 pages, illustrated (part colored), indexed. S. B. Lippincott Co., Philadelphia, Pa. 1963. $6.95.

You may have seen some of the pictures and text of this attractive book because the author, who has been Architecture and Garden Editor of the *Ladies' Home Journal* for many years, admits that this work is in part a distillation of innumerable pages which he prepared for the Journal. With a charming, informal style of writing, combined with years of experience in trying to solve the landscaping problems of his readers, Mr. Pratt has produced a very helpful guide.

SUNSET GARDEN PLANS. Editors of Sunset Books and Sunset Magazine. 80 pages, illustrated. Lane Book Co., Menlo Park, Cal. 1963. Paper, $1.75.

Do you have a new home or are you remodeling an old, neglected garden? You will find ideas galore in this booklet of forty-nine different garden design plans, with detailed planting diagrams and good photographs.

WEED CONTROL

WEED CONTROL: A TEXTBOOK AND MANUAL, 3rd ed. Crafts Alden S., and Wilfried W. Robbins. 660 pages, illustrated, bibliographies, indexed. McGraw-Hill Book Co., New York. 1962. $14.75.

The first edition of this highly regarded standard text appeared in 1942; the second in 1952; and the third in 1962. Both Dr. Crafts and the late Dr. Robbins have been among the most influential workers in the field of weed-control research. In this up-dated edition the very latest methods are described, discussed, and evaluated.

SOILS AND IRRIGATION

IRRIGATION PRINCIPLES AND PRACTICES, 3rd ed. Israelsen, Orson W., and Vaughn E. Hansen. 447 pages, illustrated, bibliographies, indexed. John Wiley and Sons, New York. 1962. $10.95.

Some major changes have been made in this revised edition (1st edition, 1932; 2nd edition, 1950). General concepts and practices in irrigation have replaced specific examples and local experience, and emphasis has been placed on basic underlying principles which govern irrigation practices. Newly formulated techniques have been included.

PROFITABLE SOIL MANAGEMENT. Knuti, Leo L., Milton Korpi and J. C. Hide. 37 pages, illustrated, indexed. Prentice-Hall, Englewod Cliffs, N. J. 1962. $7.75.

Although especially written for agricultural students, this well-organized and clearly presented textbook will be of interest and help to gardeners and conservationists in general. The study questions and suggestions for class experiments at the end of each chapter are most instructive.

BIOGRAPHY, HISTORY AND LEGENDS

ALEXANDER VON HUMBOLDT. Kellner, L. 247 pages, illustrated, bibliography, indexed. Oxford University Press, New York. 1963. $5.75.

Dr. Kellner, who is lecturer in Physics at the Imperial College in London, offers a fascinating biographical sketch of the great explorer-scientist from her viewpoint as a physicist. Her narrative style of writing creates a vivid portrait of this dynamic personality.

DIARY OF AN EARLY AMERICAN BOY: NOAH BLAKE, 1805. Sloane, Eric. 108 pages, illustrated. Wilfred Funk, New York. 1962. $6.50.

The discovery of a small, leather-bound, wood-backed volume—a diary of a fifteen-year-old farm boy, Noah Blake—inspired Eric Sloane to make a selection of quotations from the diary, to embellish these with some hundred pen-and-ink drawings and a running explanatory text; in short, to recreate in detail some of the scenes and activities that were part of the everyday life of a farm boy of the early nineteenth century. The result is a beautiful book with a charming format in keeping with the quaintness of its contents.

THE FLOWERING HAWTHORN. Williamson, Hugh Ross. 102 pages, illustrated. Hawthorn Books, New York. 1962. $3.50.

Near the steps of the Museum of The New York Botanical Garden is a Glastonbury thorn which originally came from England as a young plant, a scion of the stock of the tree that once grew on Weary-all Hill near Glastonbury Abbey. The story of St. Joseph of Arimathea and the thorn that flowered (according to legend) every Christmas morn is charmingly told by Mr. Williamson, who is a well-known English historian, theologian, playwright, and novelist. The delightful woodcuts are the work of Clare Leighton.

JOHN CLAYTON, PIONEER OF AMERICAN BOTANY. Berkeley, Edmund, and Dorothy Smith Berkeley. 236 pages, illustrated, bibliography, indexed. University of North Carolina Press, Chapel Hill. 1963. $6.00.

The spring beauty of the woods, *Claytonia virginiana* L., is one of our most familiar wild flowers but few know very much about John Clayton for whom the great Linnaeus named this delightful American plant. This scholarly, documented biography of one of our important pioneer American botanical collectors, whose contemporaries were Benjamin Franklin, Peter Collinson, Mark Catesby, and John and William Bartram, has been written by Dr. and Mrs. Berkeley after much research in the libraries of this country and abroad. It is indeed a fine

contribution to our eighteenth-century botanical history.

THE VITAMIN HUNTERS. Von Haller, Albert. Translated from the German by Hella Freud Bernays. 307 pages, indexed. Chilton Co., Philadelphia. 1962. $5.95.

If you have enjoyed reading about the trials, tribulations, and thrills of the much-written-about hunters of microbes, you will undoubtedly be fascinated by this engrossing account of the accomplishments of such men as Abderhalden, von Bunge, Hopkins, and Lane, who discovered the cause and cure of beriberi, scurvy, pellagra. rickets, and other nutritional diseases.

REGIONAL BOOKS

BECKONING DESERT. Ainsworth, Edward Maddin. 264 pages, illustrated. Prentice-Hall, Englewood Cliffs, N. J. 1962. $5.95.

Vivid, dramatic, sympathetic impressions of the awe-inspiring desertland of southern California by a talented writer who has spent most of his life writing and studying its history, folklore, geology, flora and fauna, and its people.

CALIFORNIA MOUNTAIN WILDFLOWERS. Munz, Philip A. 122 pages, illustrated (part colored), indexed. University of California Press, Berkeley. Paper, $2.95.

Dr. Munz has added another ideal sectional flora to his California wild flower series, which he has written for the naturalist layman who is not too familiar with technical botanical terms. This new title is similar in format to that of his *California Spring Wildflowers* (1961), and *California Desert Wildflowers* (1962) and covers almost three hundred different plants (96 color photographs and 180 line drawings).

CAROLINA GARDENS. Shaffer, E. T. H. 326 pages, illustrated, indexd. The Devin-Adair Co., New York. 1963. $6.95.

A welcome reissue of an old favorite (first published in 1937) which has been out-of-print for over twenty years. It is a romantic history and guide of the great gardens of North and South Carolina, many of which are no longer in existence. In it is traced the fascinating story of the development of indigo, rice, and cotton.

DEATH VALLEY WILDFLOWERS. Ferris, Roxanna S. Drawings by Jeanne R. Janish. 141 pages, illustrated, bibliography, indexed. Death Valley Natural History Association, Death Valley, Cal. 1962. Paper, $1.50.

For the layman botanist here is an ideal authoritative guide to over one hundred of California's desert flowers, with carefully drawn illustrations giving, in many cases, a habitat sketch as well as flower and leaf details.

DRAWINGS OF BRITISH PLANTS: BEING ILLUSTRATIONS OF THE SPECIES OF FLOWERING PLANTS GROWING NATURALLY IN THE BRITISH ISLES. Ross-Craig, Stella. Part XVIII: Compositae (4). 41 plates, indexed. G. Bell and Sons, London. 1963. Paper, $1.50.

Includes the following genera: *Hieracium*, *Hypochoeris*, *Leontodon*, *Taraxacum*, *Lactuca*, *Mycelis*, *Cicerbita*, *Sonchus*, *Tragopogon*, and *Scorzonera*.

ECOLOGICAL STUDIES OF THE FLORA AND FAUNA OF THE CURECANTI RESERVOIR BASINS, WESTERN COLORADO. Woodbury, Angus M., and others. 285 pages, illustrated, bibliographies, indexed. (Anthropological Papers No. 59. Utah Colorado Series No. 8) University of Utah Press. Salt Lake City. 1962. Paper, $4.00.

This series of papers deals with the flora and fauna that will be inundated when the Curecanti reservoirs are filled. The ecological studies were made as "by-products" of an expedition conducted by the University of Utah from June 26 to July 23, 1961, under the direction of Dr. Angus M. Woodbury.

THE ECOLOGY OF THE GWEMBE TONGA. Scudder, Thayer. 274 pages, illustrated, indexed. (Kariba Studies vol. II) The Humanities Press, New York. 1962. $7.50.

A fascinating, scholarly account of the life of a primitive, agricultural people, the Gwembe Tonga, prior to their removal to make way for the Kariba Lake project. This report is based on an intensive field study carried out during October 1956 to September 1957 and contains heretofore unpublished data on the vegetation, fauna, soils, and climate of the Gwembe Valley, which is located some sixty miles downriver from Victoria Falls.

FLORA DE CUBA, Vol. 5. Alain, Hermano (Dr. E. E. Liogier). 362 pages, illustrated, bibliography, indexed. Editorial Universitaria, Universidad de Puerto Rico, Rio Piedras. 1962. Paper, $3.00.

This is the final volume of the work on the Phanerogams. Contents: Rubiales, Valerianales, Cucurbitales, Campanulales, Asterales.

FLORA OF ILLINOIS: CONTAINING KEYS FOR IDENTIFICATION OF FLOWERING PLANTS AND FERNS, 3rd ed. Jones, George Neville. 401 pages, indexed. (The American Midland Naturalist Monograph No. 7) University of Notre Dame Press, Notre Dame, Ind. 1963. $7.50.

The first edition of this flora was published in 1945. Because there was continued demand for a third edition after the second edition (1950) was out-of-print, the author brought out this present volume with additional data on occurrence and distribution of species. As stated in the introduction: "The sequence of families followed herein will be more or less familiar to those botanists who are acquainted with Hutchinson's *British Flowering Plants*."

SIERRA NEVADA NATURAL HISTORY: AN ILLUSTRATED HANDBOOK. Storer, Tracy I., and Robert L. Usinger. 374 pages, illustrated (part colored), bibliography, indexed. University of California Press, Berkeley. 1963. Paper, $4.95.

Compact but comprehensive is this deluxe handbook of the flora and fauna of the Sierra Nevada, including more than seven hundred and fifty illustrations (over two hundred in color) of the commoner plants and animals. Plant subjects include a selection of fungi, lichens, ferns, wild flowers, shrubs, and trees with only examples of the grasses, sedges, and rushes. Frequent references are made to the uses of these plants by the Indians and early settlers. The simple identification keys, showing color and morphological differences, serve as useful adjuncts.

AQUATICS AND LIMNOLOGY

AQUATIC ANGIOSPERMS: A SYSTEMATIC ACCOUNT OF COMMON INDIAN AQUATIC ANGIOSPERMS. Subramanyam, K. 190 pages, illustrated (colored front.), bibliography, indexed. (Botanical Monograph No. 3) Council of Scientific and Industrial Research, New Delhi. 1962. $6.00.

The present monograph describes and illustrates with excellent detailed botanical drawings the more common aquatic flowering plants that occur in Indian fresh waters; a few marine species are included. It contains keys to families, genera, and species, with full descriptions for each species. Of particular interest are the notes on the economic uses of these plants.

AQUATIC PLANTS OF THE PACIFIC NORTHWEST WITH VEGETATIVE KEYS, 2nd ed. Steward, Albert N., La Rea J. Dennis and Helen M. Gilkey. 261 pages, illustrated, bibliography, indexed. Oregon State University Press, Corvallis. 1963. $4.50.

In less than two years the first edition (1960) of this manual of western fresh-water aquatics went out-of-print. In the new revised edition some "borderline" plants have been added, and the number of illustrations increased. A supplemental key to families based on floral characters has also been added.

LIMNOLOGY IN NORTH AMERICA. Frey, David G., ed. 734 pages, bibliographies, indexed. University of Wisconsin Press, Madison. 1963. $8.50.

The list of names of the thirty-two prominent limnologists who are contributors to this sizeable volume is impressive. In this work, produced under the auspices of the American Society of Limnology and Oceanography, with the financial support of the National Science Foundation, various aspects of limnology for each of several subdivisions of the North American continent are presented and reviewed. Additional non-regional chapters contain general discussion of reservoirs, farm ponds, paleolimnology, and sanitational limnology. The two final chapters are devoted to a history of the American Society of Limnology and Oceanography and to a forecast of the future importance of limnology in this country.

CONSERVATION

MAN AND HIS EARTH. Scarseth, George D. 199 pages, illustrated. Iowa State University Press, Ames. 1962. $4.50.

Dr. George Scarseth completed the writing of *Man and His Earth* just before his death in March, 1962. In an eloquent biographical note by Dr. John Strohm, we read: "Here was a man with countless degrees and titles and experiences who was the most down-to-earth intellectual I've ever met." Through the pages of this present book run the thoughts and observations of this beloved teacher and respected agronomist on soils, plants, and man as they relate to each other.

VANISHING WILDLIFE. Pinney, Roy. Foreword by H. R. H. Prince Bernhard of the Netherlands. 193 pages, illustrated, bibliography, indexed. Dodd, Mead and Co., New York. 1963. $5.00.

"Within the past two hundred years many of nature's beautiful and valuable creatures have vanished from the earth . . . These creatures were victims of our civilization, a civilization which prides itself on fighting a 'winning battle' against nature." These are the initial fighting words of Roy Pinney, an ardent supporter of the World Wildlife Fund, in his most attractively illustrated book on near-extinct wildlife. Mr. Pinney who has devoted many years to photographing wildlife throughout the world has produced an admirable and stirring book; it should do much to spread the gospel of conservation education.

OTHER BOOK REVIEWS

BOTANIC MANUSCRIPT OF JANE COLDEN, 1724-1766, FIRST WOMAN BOTANIST OF COLONIAL AMERICA. Published by the Garden Club of Orange and Dutchess Counties. Limited edition. "Jane Colden," Box 389, Newburgh, N. Y. April 1963. $10.00.

This manuscript was found in the British Museum (Natural History) in London. How it came there is told in a delightful introduction by Elizabeth Hall. The book was edited by Dr. H. W. Rickett, made up by the Chanticleer Press in New York, and printed by Brueder Rosenbaum in Vienna, Austria.

The author, Jane Colden, was the daughter of Cadwallader Colden, who lived in Orange County, New York, in pre-revolutionary times and was one of the best informed persons in the British Colonies. Among his friends were Peter Kalm, John and William Bartram, Alexander Garden, and Peter Collinson. He corresponded with statesmen and other amateur and professional scientists, many of whom visited him.

Jane helped with the household tasks, but was deeply interested in botany. In her description of plants, she used botanical terminology and illustrated them with impressions of leaves made with printer's ink. When her father saw how interested she was in botany, he sent to Europe for botanical books for her. Her writing was very legible, and each page of her manuscript is reproduced alongside the printed copy. Her text was enlivened with notes on the uses of the plants, which she gleaned from chatting with country people.

She was married in 1759 to Dr. William Farquahar, and she apparently discontinued her pursuit of botany. She died in 1766, the same year in which her only child died.

A charming book and good-looking, it also gives glimpses of the way people lived in the eighteenth century. The Garden Club of Orange and Dutchess Counties is to be congratulated on its achievement.

HELEN M. FOX
Mt. Kisco, N. Y.

THE OBSERVER'S BOOK OF LICHENS. Kershaw, K. A., and K. L. Alvin. 126 pages, illustrated, indexed. Frederick Warne & Co. Ltd., London and New York. $1.25.

This handy pocket-size book is a useful guide to the study of lichens. It is an introduction to the structure and reproduction of lichens as well as to the methods of collecting and identifying them. A key to the commoner and more easily recognized British lichens, including color reactions to chemical substances, a glossary, bibliography, and index are included. Besides the attractive illustrations, there are nine figures of line drawings of microscopic structures.

MARY FLEMING

SCIENTIFIC GUIDE TO PEST CONTROL OPERATIONS. Truman, L. C. and W. L. Butts. 181 pages, illustrated. Pest Control Magazine, Cleveland, Ohio. 1962. $7.25.

Without doubt, this book is the best, most comprehensive, and up-to-date compilation of the subject available. Prepared under the direction of the department of Entomology of Purdue University, it covers the controls for all the more important pests of man and of the household. This well-illustrated book is not only invaluable to commercial pest control operators, but also to home owners, public health workers, sanitarians, entomologists, and research workers.

P. P. PIRONE

CROP PROTECTION, 2nd ed. Rose, G. J., 490 pages, illustrated, indexed. Chemical Publishing Co., Inc., New York. 1963. $11.00.

First published in Great Britain in 1955, this is the second revised edition as well as the first American edition. Although still quite British in its approach to the field of crop protection, this edition includes most of the newer pesticides available both in Great Britain and the United States. Major topics include: Formulations, Chemicals, Application, Machinery, Concentrate Spraying, Seed Treatments, Turf Protection, Stock Protection, and Protection of Stored Products. Three appendixes are included: Spraying Suggestions, Summary of Weed Control, and Agricultural Tables.

P.P. PIRONE

PLANT METABOLISM. G. A. Stafford. viii + 152 pp. Illustrated. Harvard University Press, Cambridge, Mass. 1963. $2.75.

When reviewing a book, the reviewer should attempt to direct his comments towards the audience for which the book was intended; it would be folly to recommend *The Bobbsey Twins* to a male college junior. *Plant Metabolism* has me stumped. It is too detailed for the casual reader who wants a briefing on the subject, to condensed for an undergraduate course in plant physiology, and too simple for the professional scientist. Although well written and illustrated with imagination, I feel that it will serve best as a review of metabolism for the non-physiological botanist cramming for the doctoral oral examination. The volume is heartily recommended for this purpose.

RICHARD M. KLEIN

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NOTICE TO SUBSCRIBERS

Starting January 1, 1964, subscription to *The Garden Journal* will be on the calendar year. Hereafter all subscriptions will start with the first issue of the year, the January-February, and expire with the last, the November-December. Annual subscription $3.00. Single copies $.55. Foreign countries and anywhere outside the continental United States, $.50 a year extra. Back issues $.75 a copy.

PLANT TISSUE CULTURE AND MORPHOGENESIS. A. C. Hildebrandt, W. Tulecke, G. Guinn, E. Boll, and A. H. Haber. J. C. O'Kelly (ed.) 88 pp. illustrated. Scholar's Library, N. Y. 1963. $3.49.

The above listed authors have prepared summaries of the current status of their respective fields. The articles are clearly written for the specialist and should prove to be useful.

RICHARD M. KLEIN

LETTERS TO THE EDITOR

I have just seen the May-June issue of *The Garden Journal* with the letter from Hortense Spoehr (Mrs. Horace P.) Miller concerning the Lambert Herbarium. Please, Mr. Barneby, do encourage her in her research. It would be marvelous to have the complete story. I first became interested in the collection when I saw the "Lewis and Clark" sheets at Philadelphia. Now I have in my office material from Geneva, including specimens from which Jackson's original *Ormosia* illustrations were made—recognizable as mirror images!

VELVA E. RUDD, *Associate Curator*
Division of Phanerogams
Smithsonian Institution
Washington, D. C.

You may be interested to know that I learned just too late to incorporate in the article, "Treasures of the Garden's Herbarium, *Reliquiae Haenkeanae*," in the July-August issue of *The Garden Journal* that there are a few sheets of Haenke's specimens in the Chicago National History Museum.

RUPERT C. BARNEBY
Greenport, L. I.

MEMBERSHIP

We were delighted to welcome the following new members between April 1, 1963, and July 31, 1963.

Contributing

Mrs. Dumont Clark
Mrs. Henry G. Leach
Mrs. Edwin De T. Bechtel*
Mrs. Sidney Gilder De Kay*
Mrs. Frederic W. Ecker*
Mrs. B. Brewster Jennings*
Mrs. William M. Jennings*
Mrs. Walter H. Page*
Arthur K. Watson*
Mrs. V. Webb*

* Change in Classification

Husband and Wife

Mr. and Mrs. George K. Bennett
Mr. and Mrs. G. Randall Brubaker
Mr. and Mrs. James B. Campbell
Mr. and Mrs. Warren Clark
Mr. and Mrs. William J. Cowdrey
Judge and Mrs. Nicholas F. Delaji
Mr. and Mrs. John Eis
Mr. and Mrs. Oliver H. Everett
Dr. and Mrs. Herbert Philip Frank
Mr. and Mrs. Richard D. Friedman
Mr. and Mrs. Harold A. Goldsmith
Mr. and Mrs. Elger N. Greenwall
Dr. and Mrs. K. Harpuder
Mr. and Mrs. J. W. Huffer
Dr. and Mrs. Raymond A. Katzell
Mr. and Mrs. Nicholas Kelley
Mr. and Mrs. John M. Kingsley
Mr. and Mrs. Frank W. Knight, Jr.
Mr. and Mrs. Arthur Kuris
Mr. and Mrs. Paul Lambert
Dr. and Mrs. Joseph Lander
Mr. and Mrs. Frank H. Lee
Mr. and Mrs. Edward A. Le Roy, Jr.
Mr. and Mrs. Herbert W. Marachie
Mr. and Mrs. A. S. Martin
Dr. and Mrs. Rene C. Mastrovito
Mr. and Mrs. William C. Miller
Mr. and Mrs. Saul Poliak
Dr. and Mrs. George E. Randall
Mr. and Mrs. John H. Schwieger
Mr. and Mrs. Max Steinkohl
Mr. and Mrs. Gardner D. Stout
Mr. and Mrs. F. Hobart Walker
Mr. and Mrs. Charles A. Wight
Mr. and Mrs. Stephen Peter Wild
Mr. and Mrs. S. Bernard Wortis
Mr. and Mrs. John M. Young

Annual

Miss Florence B. Adams
A. M. Arnstein
Mrs. Lillian S. Auster
Herbert Bijur
Miss Virginia Borgese
Mrs. F. Nelson Breed
Mrs. John J. Bundschuh
Mrs. Mary Burrows
Mrs. Rex E. Buxton
Mrs. Janet M. Carlson
Arthur S. Casella
Brother Richard Cassin C.F.X.
Mrs. Benjamin S. Cohen
Mrs. Barclay Cooke
Mrs. J. D. Cranford
Charles H. Daniels
Mrs. Eli Whitney Debevoise
Miss Patricia De Julius
James H. Dorsh
Edwin Eberman
Mrs. Fon Eng
Mrs. Mortimer Feuer
Arthur R. Frederick
Mrs. Bernard L. Gladieux
Miss Ana Sofia Gonzalez
Mrs. Francisco Aurelio Gonzalez
Mrs. Loren Greeley
Mrs. Erich O. Grunebaum
Mrs. L. H. Grunebaum
Miss Jessie Hantman
Ralph J. Hartman
Mrs. J. Elliott Hochschwender
Mrs. Winfred B. Holton
Mrs. A. S. Horner
Ronald Ippolito
Mrs. N. L. Jarvis
Mrs. H. T. Kessler
Mrs. Margaret E. Koch
Mrs. Abraham Krasnoff
George Kurland
Mrs. H. B. Kurzrok
Leslie Laking
William John Leffler
Michael Levandowsky
Mrs. William H. Lewis, Jr.
Miss Marcia St. Lifer
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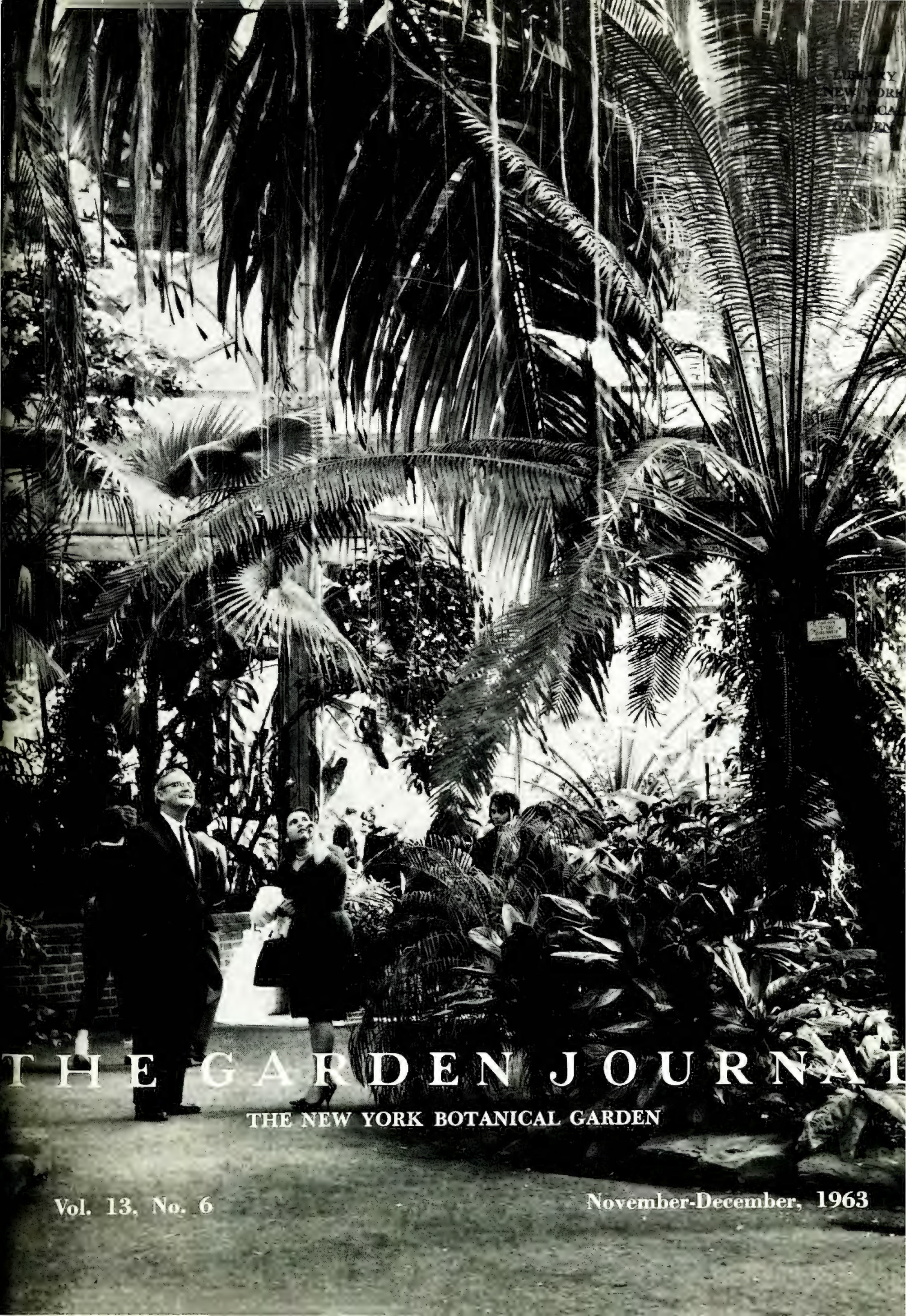

THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Vol. 13, No. 6 November-December, 1963

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DOROTHY EBEL HANSELL
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Calendar

November 8, 1963. Chrysanthemum Show in the Conservatory of The New York Botanical Garden opens.

November 9, 10, 1963. Fifth Mid-American Orchid Congress, New Orleans, La.

December 12, 1963. Holiday House Tour, sponsored by the Volunteer Associates, The New York Botanical Garden.

December 13, 1963. Christmas Show in the Conservatory of The New York Botanical Garden opens.

January 9, 16, 23, and 30, 1964. Lecture Series sponsored by Volunteer Associates, The New York Botanical Garden, in the French Institute Building, 22 East 60th St., New York.

March 15-20, 1964. Eighteenth Annual Williamsburg Garden Symposium: Theme "Our Evolving Garden Heritage."

April 18-25, 1964. Thirty-first Annual Historic Garden Week in Virginia.

April 22 - 24, 1964. Garden Forum at the Henry Ford Museum, Greenfield Village, Dearborn, Mich.

April 29, 1964. Members' Garden Party.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

May 21, 1964. Spring Garden Tour, sponsored by Volunteer Associates, The New York Botanical Garden, to Far Hills, Somerville, Peapack, and Gladstone, N. J.

September 30, October 1, 2, 3, 1964. Nineteenth Annual American Horticultural Congress; October 2 to be spent at The New York Botanical Garden. Hotel headquarters, Commodore Hotel, New York City. Annual meetings of the American Association of Botanic Gardens and Arboretum will be held in conjunction with the Congress.

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MOSSES OF LAWN AND GARDEN

By EDWIN H. KETCHLEDGE

Dr. Ketchledge is Associate Professor of Forest Botany, State College of Forestry at Syracuse University, Syracuse, New York.

MENTION THE WORD "moss" to the average gardener and he will immediately think of an unhealthy lawn or unkempt garden. And rightly so, for the presence of moss generally indicates growing conditions unfavorable for the usual lawn and garden plants. Yet even the most-manicured lawn and best-managed garden may have its moss, however inconspicuous and unnoticed by the owner. This is because various moss species, vigorous for their size, have a way of invading the best of gardens, of appearing unnoticed among the grasses, between the flagstone of walks or on garden walls, on the trunks of trees or under the shubbery. Sooner or later mosses will be found growing in unattended corners of most gardens, or flourishing in neglected out-of-the-way spots. Here they do little harm; in fact, they may be beneficial, serving to reduce microerosion or adding a little color to drab spots unsuited to larger flowering plants. We may try, of course, to keep mosses under control by proper lawn care and by periodic weeding in the garden, but by learning a little about these hardy volunteers, we may enhance our appreciation of the green world in which we live.

The more aggressive species of moss are the ones that usually invade the lawn-garden habitat. Although we tend to think of these successful species as "weedy" plants, this in no way diminishes their natural charm. The Japanese have long recognized the distinctive beauty of mosses and have used them to advantage in landscape gardening.[1] Saihôji Temple, the "moss" temple in Kyôto, Japan, is world-famous for its graceful arrangements of mosses distributed among rocks and trees and water, the garden creating an atmosphere of woodland peace and tranquility. It is interesting to note that twelve of the forty-six temple mosses are cosmopolitan, that is, world-wide species occurring also in New York State, and of these nine might be considered "weedy" because of their general frequency and abundance; many of the remaining species are Asian counterparts to common American species. Beauty, indeed, is in the eyes of the beholder.

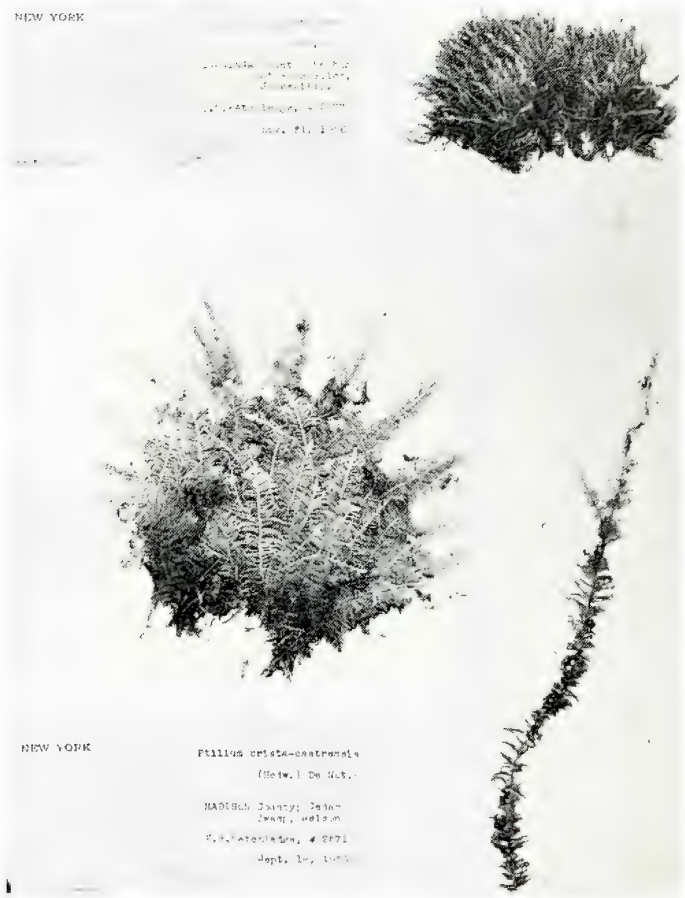
Just what are mosses, and why are they aesthetically pleasing to some? In an earlier report[2] we noted that mosses are delicate green plants which reproduce by spores. The vegetative plant consists of a small stem rarely over two inches tall, bearing minute leaves but no roots or specialized woody tissues. The individual shoots may be erect, in which case the clump of moss forms a tuft or cushion, or the stems may trail over the ground, branching in various patterns to form a thin carpet or interwoven mat. In both cases capsules of spores are at intervals elevated above the stand on short, naked stalks. In most species the capsule terminates in a pore from which the spores are released when mature; generally the pore is fringed with a lacy circle of filament-like teeth, the peristome. All this may be seen with a simple hand lens or magnifying glass of 10X or 12X strength. Thus armed, the gardener may witness the diverse array of form, color, and texture displayed by individual moss plants, as well as enjoying the lovely massed effect of large patches and populations. Mosses are a unique life-form, challenging our curiosity if only we open our eyes to such horizons of the natural world.

Granted that "mossing" may be an enjoyable if momentary diversion from ordinary gardening activities, where should one look for mosses and what are some of the species he is likely to encounter?

Generally the less disturbed the habitat, the greater the chance of finding mosses. Most species require moist spots which dry out slowly between rains. Some of the "weedy" species, however, are weedy simply because they are adapted to a limited or fluctuating water supply and thus get along well in sunny, dry locations. In the absence of rain even a light dew each night may be sufficient for continuous growth in some species. Other mosses, during a period of prolonged drought, curl up, without damage, and remain dormant until moisture returns. Because it prevents excessive drying of the site, shade is conducive to moss growth, although no moss can long tolerate a permanent cover such as fallen leaves. Heavy clay soils, high in water-holding capacity, support mosses better than light, sandy soils which dry out quickly. Also, the less fertile the soil the better chance the mosses have to compete successfully with larger plants.

This is only part of the story of moss abundance, how-

Top. Flat fork moss, *Fissidens adiantoides*, a cushion moss.
Bottom. Plume moss, *Ptilium crista-castrensis*, a carpet moss.



ever, because many of our common species need no soil, at least soil in the usual sense. Many species grow attached to stones, rock walls, foundations, tree trunks, dead wood, the edges of shingles, and similar habitats essentially devoid of soil. Here, on the severest of sites, the minute particles of dust blown in by the wind, or washed down by the rain, suffice to supply the needs of the plants for minerals. Also, being small, simple plants, mosses can grow in the smallest cranny and opening. Briefly, then, mosses may share the lawn-garden habitat, occupying niches too small for larger plants, and elsewhere compete for living space where cultivated plants are weakened by neglect. Thus the answer to our first question is that the observer may find mosses growing any place in the garden where a little light strikes the site and where a little moisture collects from time to time.

Our second question, what species will one likely encounter, is difficult to answer. The ranges of a few cosmopolitan species are identical, and a few others coincide approximately in area; but the vast majority of species differ markedly both in geographical distribution and in over-all abundance within their ranges. Accordingly, we shall restrict our reply to some of the more common mosses of New York State, realizing that most of these species also occur with varying frequency elsewhere in the eastern states, and in a few cases on other continents.

Our list of common lawn-garden mosses might properly begin with the two species known from each of the twenty-six distributional districts that are used to record the occurrence of species in the State.[3] The first, purple heath moss *(Ceratodon purpureus)* is without doubt our most ubiquitous moss, growing along paths, at the base of trees, on stone walls, on compacted soil, even on the roofs of old buildings. It is equally at home at sea level and on the cemented walls of the emergency shelter atop Mount Marcy, highest of the Adirondack peaks. Yet this is not an easy species to recognize unless it is in fruit, because the deep green, compact tufts may be mistaken for any one of several other species. Fortunately *Ceratodon purpureus* fruits freely and its capsule is distinctive, a deep reddish or purplish brown, inclined at an angle to the stalk, and slightly curved. Its most noticeable feature is the several longitudinal furrows or grooves which develop as the capsules mature and shrink after sport discharge in early summer.

The other widespread species, known from all sections of the State, is woodsy mnium *(Mnium cuspidatum).* As with its close relative, the toothed mnium, which was described in the earlier report[2], this moss has two types of leafy green shoots; some are erect and may produce capsules, while others arch over sideways and are stoloniferous. The woodsy mnium is frequent in lawns but is generally confined to moist, shaded banks or the shade of such trees as the maples. In the spring the stands may be covered with a dense crop of green capsules, each ovoid or oblong in shape and pendulous from the tips of the stalks. When sterile the plants may be identified by the egg-shaped leaves bordered with large, conspicuous (with a hand lens) teeth from the tip halfway to the leaf base.

Probably our hardiest, most xeric lawn moss is *Weisia controversa,* a small plant often hidden by the grass which overtops it. On the thinnest of lawns, where the sun bakes the soil like rock, *Weisia* flourishes unharmed; indeed, the

A cushion moss, *Weisia controversa*, on bare ground between grass in an unhealthy lawn.

poorer the lawn, the more abundant *Weisia.* This species may be recognized by its small, bright yellow-green patches, unlike any other lawn moss of exposed, sunny sites. Up close, with the aid of a hand lens, the leaves are seen to be curled and crisped if the plants are dry. Upon being moistened, the leaves spread out and exhibit a feature unique to lawn-garden mosses: the margins of the leaf are involute, that is, rolled inward so that the leaves appear tubular. Plants fruit in the spring, at which time the small brownish capsules have the appearance of being freshly varnished.

If, when we are looking for *Weisia,* the soil is fairly moist, we may find another short-stemmed, pygmy moss, namely *Phascum cuspidatum.* This species generally occurs as individual plants or in small tufts. The leaves are ovate, pointed at the tip, and a translucent light green in color. The globose capsules may be borne two or three to a leafy shoot, but they are partially hidden by the leaves. *Phascum* is fairly common on the soil in flower pots of conservatories. Growing with the *Phascum* on wet soil or in flower pots may be *Pottia truncata.* In fact, it is sometimes confused with *Phascum* but differs in having the leaves more conspicuously spine-tipped and in the distinctive urn-shaped capsule, broadest at the mouth.

One of our frequent woodland mosses, the flat fork moss *(Fissidens adiantoides*[2]*),* is sufficiently vigorous to invade bare spots in the lawn-garden area, especially in the shade of shrubbery and buildings. The green shoots are perhaps the most distinctive of all mosses because of the peculiar leaf arrangement. The leaves are aligned in two rows, on opposite sides of the stem, with the leaf blades inserted vertically, perpendicular to the ground rather than horizontal. Moreover, each leaf base is split and clasps the base of the leaf next above, much as in the fashion of an iris. In sunny areas the plants are greatly reduced in size, rarely over half an inch tall, and their brownish green coloration shows the effects of the severe growing conditions. *Fissidens* grows well, however, in shady rock gardens where bare patches of soil are available for invasion.

Three species of moss are commonly found between the flagstones of walks, along garden paths, or in the cracks of sidewalks. One, silvery thread moss *(Bryum argenteum*[2]*)*, is easily identified by the silvery tips to many of the leaves. The second, common bryum *(B. caespiticium)* is one of our most abundant, widespread mosses, yet is difficult to separate from other species. The plants form dense mats, often a foot or more across, which are a dirty yellow-green but appear velvety from a few feet away. Under the lens the individual plants resemble silvery thread moss, but the leaves are more sharply pointed and are green all the way to the tip. The third species, long-necked bryum *(Leptobryum pyriforme)*, by contrast is one of the easiest species to recognize. The leaves are slender, hairlike, a delicate light green. The capsules differ from all other lawn-garden mosses in having a narrow, constricted neck nearly as long as the larger spore-containing portion. Most gardeners have seen the long-necked bryum growing on the soil in flower pots, or even on the sides of clay pots. The species also occurs, less frequently, on moist rocks and stone walls.

One of our very weedy mosses may appear suddenly one season around waste places, such as the unfrequented corner of the garden where leaves are burned in the fall or where soil is disturbed and then left fallow. This is cord moss *(Funaria hygrometrica*[2]*)*, a species commonly studied in botany courses as being representative of mosses in general. The bulblike green plants are easily overlooked, but the pear-shaped capsules are very distinctive. Elevated an inch or two above the ground, the capsules turn chestnut-brown when mature and are unsymmetrical, irregularly furrowed, with the mouth tilted obliquely to one side. The stalks supporting the capsules are markedly hygroscopic; dipped in water they suddenly twist several turns, then gradually return to the original position as they dry out in the air after a few minutes, swinging the capsule around in broad arcs in the process.

Barbula unguiculata is another moss of waste places, particularly where the soil is calcareous and has been disturbed a season or two earlier. A search for this species is well worthwhile, for the observer will be rewarded at sight of one of the most beautiful peristomes of all mosses. True, the green shoots with lance-shaped leaves are not distinctive; but the erect, brown capsules display a lovely pink or red peristome of thirty-two filiform teeth twisted spirally at least two complete turns. Several other less-common genera in the family also possess this type of peristome, including species of *Tortula*[2] which may be found on limestock rocks and cemented walls.

If a grove of trees is adjacent to the lawn-garden area, two common woodland mosses may be present. Both prefer acid soils, rotting wood, moist banks, or the base of trees. One, silky fork moss *(Dicranella heteromalla)*, resembles broom moss *(Diranum scoparium*[2]*)* because the thin, slender, hairlike leaves are all swept to one side. The capsules, slightly inclined and unsymmetrical, become furrowed at maturity and are distinctive on account of the constriction below the obliquely positioned mouth. The other species, *Pohlia nutans,* is not easy to recognize at first; in fact, a noted American bryologist, A. J. Grout, once commented that this was the species most frequently sent him for identification. When sterile *Pohlia* could easily be taken for any number of mosses with deep green leaves, tapered to a point, and borne on a reddish stem. The club-shaped capsules, however, are several times longer than broad, tan-colored, gradually tapered from the base to the mouth, and are set at a right angle to the stalk.

Very few large mosses occur in the lawn-garden habitat, because these simple plants cannot take the traffic typical of gardening and lawn activities. However, if the garden area includes some relatively undisturbed ground away from paths and walks, several more robust species may be found. One of these is the common haircap *(Polytrichum commune*[2]*)*, which on wet, sandy spots may replace grass as a sod-forming plant. *Polytrichum* stems are stiff, erect, un-

Common haircap moss, *Polytrichum commune*, replacing grass as a sod-forming plant on a sloping bank.

branched, and often grow several inches tall. The leaves, yellow-green and spirally arranged, stick out sharply from the stem and, because they are narrow and pointed, give the plant the appearance of a spruce seedling. Under the lens the marginal teeth are evident; also, the leaf will look very thick because of the longitudinal rows of lamellae on the upper surface. Many of the sterile shoots, actually male plants, terminate in a rosette of wide-spreading leaves which look like delicate green flowers. The fertile shoots support long stalks and capsules which give the plants a total height of five or more inches. The capsules are unique among mosses—a quarter of an inch long, cubical in shape, and distinctly four-angled. In addition, the neck of the capsule is ringed with a swelling and the mouth covered with a thin, white membrane.

Growing with the common haircap or elsewhere in sunny spots, one may encounter *Polytrichum juniperinum,* a species differing in having leaves bluish green, with yellow-brown hair-point at the end, and a longer, more oblong capsule. A third species, typical of sunny, sandy locations, is *Polytrichum piliferum;* it looks like the common haircap, but each leaf ends in a long white awn, thus giving the plants a hoary appearance.

In areas where the haircaps occur, one should also look for a close relative, *Atrichum angustatum.* This moss differs in bearing broader, more flexible leaves, with the lamellae (visible with a lens) confined to the conspicuously broad midrib of the leaf. The capsules are long-cylindric and erect, rather than inclined to the stalk as in haircaps. *Atrichum* forms lovely deep green sod in the shade of trees with broad, spreading crowns.

So far I have mentioned only cushion mosses, and indeed they are the more abundant group in the artificial environment that is the lawn-garden habitat. The carpet mosses are generally present, however, though most of them by nature grow best in forested or marshy conditions and, consequently, poorly in open, sunny areas. We should be aware that carpet mosses are taxonomically difficult species, not easily identified when found sterile or in unfavorable sites; and that, though the area of lawn or garden occupied may be relatively large, the number of species represented more often is low. In addition, some of the species distinctions are based on microscopic characteristics not discernible with a simple hand lens. With these facts in mind, I include here seven carpet mosses occasionally encountered as weeds in lawns or intermixed with low-growing lawn-garden plants.

The first actually has the appearance of a cushion moss, because the main stems spread outwardly, hidden in the surface of the soil and only the side branches are erect and leafy. The species, tree moss *(Climacium americanum*[2]*),* is perhaps our most robust, handsome moss. Because of its large size, up to three inches tall, it will be found only on slopes and banks where the grass is not cut short. There it competes successfully with the grass, especially if the slope is moist and shady, and it may even outgrow the grass. Each individual stem resembles a small pine tree, with a strong central stem and numerous side branches standing out in all directions. Commonly the stems grow clustered so that the stands of *C. americanum* look like miniature forests of stately conifers.

In contrast to tree moss, most carpet mosses bear leaves

A common carpet moss, *Hypnum lindbergii,* spreading through grass.

on the primary stems trailing over the ground as well as on the side branches. The spore capsules generally arise from these main stems. Unfortunately for the moss observer, however, most carpet mosses of lawns spread vegetatively rather than by spores, and capsules are rarely seen; thus identifications may be possible only by genus, unless a microscope is available for detailed study.

One of our larger and more attractive mosses is *Hypnum lindbergii.* This species is a pale yellow-green similar to the color of some grasses, for which reason the plants are easily overlooked. The stems form wide, loose mats, often quite thick and deep, as they spread and branch through the grass; wherever the grass is sparse, the branching is regularly pinnate. The broad, flat leaves overlap in two rows on either side of the stem rather than standing out in all directions; the branches thus appear flattened as seen from above. Moreover, the tip portion of each leaf bends downward toward the ground, giving the plants a wind-swept appearance reminiscent of silky fork moss or broom moss. *Hypnum lindbergii* may be very abundant where the soil is continually moist, such as on the lower portion of a shady bank.

When we are looking for *Hypnum,* we may also find the light beaked moss, *Eurhynchium hians.* This species is smaller than the preceding species, however, and is quite variable in its branching habit. At times it may trail through the grass or under weeds, hardly branching at all, yet in openings it may form closely interwoven mats. Under the lens the species is easily recognized by one distinctive feature: the leaves, somewhat egg-shaped but pointed at the tip, are wide-spreading and distantly spaced along the stem at intervals nearly equal to the length of the leaves. The plants are a peculiar shiny light green, whence the first part of the common name; the second part of the name refers to the long beak atop the lid to the capsule.

One of our genera of small carpet mosses, *Amblystegium,* is often represented by one or more species in lawns or in shaded areas. The plants grow on all types of substrates so long as some moisture is present. The stems, with their attached leaves, are no thicker than a thin string at best but, because the stems branch freely, form delicate thin mats

directly upon the surface of the ground. The leaves are exceptionally small, but being erect-spreading and distantly spaced are readily visible with the hand lens. The several species may be found growing on the bare ground between clumps of grass or on decaying wood and stones in moist, shady spots. The capsules, when present, are strikingly large for such a small plant and curve over in an arc nearly 180°.

Another genus of small carpet mosses, *Campylium,* closely resembles *Amblystegium,* differing primarily in the orientation of the leaves. Whether wet or dry, the leaves stand out perpendicularly to the stem; thus, however small, the stems have a bristly appearance viewed through the hand lens. The species all occur on damp earth, bases of trees or stones, and especially on moist banks or in depressions where the surface dries slowly.

In areas of limey soils and calcareous rocks, the genus *Anomodon* is abundant. One of the species, *A. attenuatus,* becomes weedy at times on soil in shady places where the grass is thin and discontinuous, though the species is more commonly found on rocks or tree trunks. The plants are distinguished by deep green, opaque, tongue-shaped leaves. All sizes and thicknesses of branches may be found in a single clump of this moss. A second species, *A. minor,* commonly occurs on the basal portion of tree trunks; it differs in having all the branches of one size. A third species, *A. rostratus,* forms thick, yellow-green carpets on limestone rocks and cement walls.

The last mosses I shall mention, members of the genus *Brachythecium,* are large, attractive plants which are easy to recognize as a genus but difficult to separate into species. The plants trail on the ground in shaded areas, branching irregularly and intertwined with grass, or in areas of sparse vegetation form pure stands. The leaves are spirally arranged, densely clustered on the stem, broad at the base and tapered to a sharp point, and generally somewhat spoon-shaped and wrinkled longitudinally. The capsules are short, thick, dark-colored, and unsymmetrical. In the lawn-garden area *Brachythecium* rarely fruits, so the observer must be satisfied with an identification to genus only.

In other sections of our eastern states, several of the species discussed may be less abundant than various local species. Actually the moss flora from one region to another is a gradually changing mosaic of species. In part it is this regional variation which keeps our interest aroused and makes "mossing" a fascinating diversion.

One fact should be stressed—mosses around the lawn and garden may rightly be called "weeds" from the viewpoint of being uninvited volunteers, and perhaps not very attractive ones at that, but what is a weed in one man's garden may be an exciting plant in another. Dr. William C. Steere, Director of The New York Botanical Garden, once discovered that a "weedy" moss in his front lawn was actually an undescribed species new to science. Who knows what adventures may await readers of *The Garden Journal* in their gardens?

If the reader is interested in sampling the pleasures of "mossing," I recommend he purchase a copy of *Mosses With a Hand-lens* by A. J. Grout. This is an excellent introduction to the study of mosses, comprehensive in scope, yet designed specifically as a popular guide for the interested beginner. Another helpful book is *How to Know the Mosses* by Elizabeth Marie Dunham, stressing moss identification with habitats as a guide and without the use of a lens. As one's competence increases, he should seek the help of *Mosses With a Hand-Lens and Microscope* and, eventually, *Moss Flora of North America,* both by A. J. Grout. Numerous local floras are also on the market: *A Manual of the Mosses of Western Pennsylvania* by O. E. Jennings and *Mosses of Indiana* by W. H. Welch are most useful for the eastern states. For the advanced student, membership in the American Bryological Society will prove rewarding.

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A STUDY IN ETHNOBOTANY

By EDDIE W. WILSON

Mrs. Wilson, of Los Angeles, California, contributes articles on ethnobotanical and ethnographical topics to various publications including *Midwest Folklore, Journal of American Folklore, Southern Folklore Quarterly, Western Folklore,* and *Gourd Seed.* The late Dr. Frederick Webb Hodge, at one time Director of the Bureau of American Ethnology in Washington, D. C., then Director of the Southwest Museum in Los Angeles, encouraged Mrs. Wilson in her study of the American Indian. She contributed articles and poetry on the American Indian to *The Masterkey,* the bimonthly publication of the Museum.

THE EARLY AMERICAN INDIAN was exceedingly resourceful in the use of plants including trees, their lumber and bark. He not only obtained food from them, but used them in building, in manufacturing, in healing the sick and wounded, in games, in art, in ceremonial rites, and as cosmetics and charms.

The search for food came first. Few products suitable for food escaped the notice of the early Indian woman; moreover, she showed considerable skill in preserving her discoveries. She successfully experimented with root, rhizome, seed, leaf, flower, catkin, and fruit in her efforts to give her family a variety of foods. She extracted beverages from wild fruits, mints, sassafras, spicewood, wintergreen, and other plants.

According to the Cherokee the beginning of plants and animals is as follows:

It is not known when animals and plants were first made; but whenever it was, they were told to watch and keep

awake for seven nights. Of the trees, only the cedar, pine, spruce, holly, and laurel were awake to the end, and to them it was given to be always green and to be the greatest for medicine. To the others it was said, "Because you have not endured to the end you shall lose your hair [leaves] every winter." The Cherokee added: "Even weeds were made for some good purpose. . . . When the doctor does not know what medicine to use for sick man, the spirit of the plant tells him." The cedar is held sacred by the Cherokee because of its ever-living green, its balsamic fragrance. Its twigs were thrown upon the fire as incense in ceremonials.

The Indian woman planted and gathered the crops. The cultivated crops evidently originated in Mexico: The *Cucurbitaceae* (squashes, pumpkins, gourds, watermelons); *Phaseolus vulgaris,* garden beans in fifteen or more varieties; maize or Indian corn, *Zea mays,* aggregating from fifteen to twenty varieties; tobacco, *Nicotiana quadrivalvis.* She gathered wild rice, *Zizania aquatica.*

Next in importance came the dwelling—this was the work of the Indian man. Climate and the available building materials were the determining factors with each tribe.

In the Pacific Northwest, the Haida built substantial rectangular houses with sides and ends of cedar planks, which the men had laboriously split, with rude wedges of horn driven by stone adzes, from the magnificent giant cedars. Directly in front of each house stood a cedar totem pole, its animal figures forming the family crest of heraldic significance. The Pomo, Maidu, and Miwok of the California coast built cones of slabs of redwood bark. The Sierran tribes of the warmer parts of California were satisfied with a mere shelter of brush piled up on the windy side. The Omaha of the plains set posts in a circle, binding them firmly with willows, then backing them with dried grass. The Iroquois "long-houses" were bark-covered structures. The Seminole lodge was made from the palmetto, its trunk being used as the framework, its leaves for the roof and sides.

Bark was put to work in many ways. The Chippewa used the bark of the paper or canoe birch, *Betula (alba) papyrifera,* not only for canoes but for containers, funnels, dishes, trays, and fans. They twisted it into cylinders or shredded the bark fine and bound it in bundles for torches. The Tewa used the bark of the cherrystone juniper, *Juniperus monosperma,* in like manner.

When Hernando de Soto was in western North Carolina in 1540, he saw "mantles of yarne of the barkes of trees." The Indians of the Southwest wove a native cotton.

East of the Mississippi River the bow wood was made from the black locust, while west of that river the osage-orange or *bois d'arc, Maclura pomifera,* was preferred.

The Thompson Indians made the fiber of *Thuja gigantea* into rope, twine, and thread from which mats, bags, blankets, and clothing were woven.

The Indian woman was skilled in the art of basket making. Pomo feathered baskets are among the finest in the world; these may be masses of feathers, scarlet and yellow. Stems of the maidenhair fern, *Asplenium trichomanes,* form the weft, while willow, pine root, sedge root, and redbud *(Cercis canadensis)* comprise the woof. The Zuñi made baskets from split leaves of the Spanish bayonet *(Yucca aloifolia).* The Cherokee woman wove her baskets from splints of white oak, also cane.

Indian men and women liked scents and believed in charms. Scents are thought to have suggested to them the wholesomeness of the uncontaminated outdoors.

The Thompson woman wove vanilla grass, *Hierochloë odorata,* into her bags and basketry because of its odor; this was also used as a scent for clothing, and for the hair and body. It was tied on the hair and on ornaments for arm and neck. Another one of her favorites was mild mint, *Mentha arvensis* var. *canadensis,* the oil glands in stems and leaves being very fragrant.

Among the Omaha and Ponca these were favorite odors: sweet vernal-grass, *Anthoxanthum odoratum,* and sweet flag, *Acorus calamus,* whose blades were braided into garlands and worn for their pleasant odor. Berries of the meadow-rue, *Thalictrum revolutum,* were dried and placed in bags for perfume by the Gros Ventre. The Blackfoot placed leaves of the balsam fir, *Abies balsamea,* in a buckskin bag for perfume; and blossoms of dog fennel, *Matricaria matricarioides,* were dried and used for perfume by this tribe. Leaves and flowers of purple amaranth, *Amaranthus (paniculatus) caudatus* were crushed, moistened with water, and rubbed on the cheeks as rouge by Zuñi women.

Omaha and Ponca bachelors chewed the seeds of wild columbine, *Aquilegia canadensis,* as a perfume and love charm. Thompson women used the larkspur, *Delphinium menziesii,* as a charm to help them obtain and hold the affection of their men. The Pawnee used the roots of American ginseng, *Panax quinquefolium,* together with other plant substances, as a love charm. The Dakota lover sang to the flowers of the spiderwort, *Tradescantia virginiana,* as he sees in them the characteristics of his sweetheart—purity and freshness.

The Jicarilla and White Mountain Apache mother ties and hangs the woody part of prickly pear, *Opuntia emorcyi,* on the necks of her children to ward off diseases.

Suds made from *Yucca glauca* were used throughout the Southwest for washing the body, hair, and clothing.

As for dyes:—bloodroot, *Sanguinaria canadensis,* dyed the gourd rattle red in ancient days. The Omaha and Winnebago made a black dye from young twigs of the silver or white maple, *Acer saccharinum.* The Ojibwa colored with black walnut *(Juglans nigra)* hulls. The Pawnee used the dodder or love vine, *Cuscuta paradoxa,* as a dyestuff to give an orange color to feathers. The Zuñi used the flowers of *Coreopsis cardaminefolia,* to produce a mahogany-red. The Navaho, sheepherders, boiled wool for about six hours with the twigs and leaves of the aromatic sumac, *Rhus aromatica,* together with the gum of the piñon pine, *Pinus cembroides edulis,* for a blue-black dye. The Chippewa used the roots of plum, alder, sumac, butternut, oak, dogwood, or bloodroot to secure a color and then "set" it with a mineral substance, a dust which rose to the surface of certain springs. Could this dust have been iron?

On pottery taken from ancient ruins, plant forms appear as decorations. From Arkansas has come a clay bowl with two winged and crested rattlesnakes and two sunflower-like figures alternating with them. The designs are carefully engraved with a needle-like point and are adjusted to the form of the bowl in a way which suggests experience and

appreciation of the decorative value of the figures.

The gourd shape appears repeatedly in eastern pottery. On the St. John's River (Florida) pottery such vegetal forms as acorns, flowers, buds, and ears of corn are crudely portrayed.

Prominent ethnologists, as Dr. Washington Matthews and Dr. James Stevenson, have asserted that the early Indians employed many plants of real value in medicine. Plants were sacred to all the tribes, and the medicine man or shaman transmitted certain remedies to succeeding generations. He usually sang or prayed as he administered the healing remedy, claiming that he had been directed to the cure by means of a vision. And the cures were surprisingly efficacious!

The Apache shaved oak root, soaked it in water, and used this solution as an eyewash. The Mescaleros ground mesquite beans, *Prosopis glandulosa,* into powder, mixed the powder with water, and squeezed it into the eyes. The Pima used mesquite sap, and the Cherokee an infusion of smooth alder, *Alnus rugosa,* for sore eyes.

The Chippewa crushed castor-oil beans, *Ricinus communis,* mixed it with water, heated the mixture, and put one or two drops into the ear. The Pima pounded the root of the wild gourd or calabazilla, *Cucurbita foetidissima,* boiled it, and put the juice into the ear to stop pain. The Mescalero Apache twisted mesquite pods into the ear for earache.

For toothache the Alabama Indian used the bitter root of goldenrod, *Solidago minor,* putting it into the cavity to stop the ache. The Pima used the infusion of wild gourd in a hollow tooth.

For sore throat the Zuñi crushed the flowers of another goldenrod, *Solidago canadensis.* The Tewa ground and chewed horsemint, *Monardo punctata,* or bee-balm leaves, *M. didyma,* fine, added the powder to water, and drank it for sore throat, headache, and fever. The Creek boiled the bark of *Quercus texana* and drank the fusion for sore throat, while for that ailment, the San Carlos Apache chewed the root of *Janusia gracilis.*

For coughs the Omaha, Ponca, and Pawnee boiled together the fruits and leaves of the red-cedar, *Juniperus virginiana,* the decoction being used internally. The Cherokee either drank a decoction made from black snakeroot, *Aristolochia serpentaria,* or made a tea of liverwort, *Hepatica acutiloba,* or chewed its roots for coughs.

When wounded, the Mescaleros and Lipan applied the pounded root of wormwood, *Artemisia dracunculoides,* either fresh or dried, with cold water to bruises, contusions, and even fractures; repeated applications kept the part cool and prevented swelling. The Omaha and Ponca put chewed butterfly weed, *Asclepias tuberosa,* into wounds and old sores. The Pima ground the bark of the root of the screw bean, *Prosopis pubescens,* into a fine powder and mixed it with water as a dressing for wounds. The Mohegan-Pequot bound the leaves of common plantain, *Plantago major,* over stings, burns, bruises, and snake bites, applying this also to cuts and wounds. The Cherokee chewed and spit black snakeroot, *Sanicula canadensis,* upon a wound to cure snake bites. The Seminole used a species of sedge, *Cyperus,* for snake bites.

The Zuñi used Jimson weed, *Datura stramonium,* both as a narcotic and for the deadening of pain after an operation.

The Papago boiled the inner bark of the mesquite and drank this fusion for chronic indigestion. The Cherokee gave a decoction made from common speedwell, *Veronica officinalis,* to a feverish patient. The Teton Dakota made a drink from wild verbena, *Verbena hastata,* to cure stomach ache. The Omaha crushed the stems and leaves of wild touch-me-not, *Impatiens pallida,* to a pulp and applied this to the skin of those afflicted by eczema.

The Mohegan-Pequot steeped the bark of white oak, *Quercus alba,* using this as a liniment.

One of the most popular plants with many tribes for healing purposes was yarrow, *Achillea millefolium.* An infusion was used by the Winnebago to bathe swellings, also to put into the ear for earache. The Zuñi applied the whole plant, ground and mixed with cold water, to burns. The Thompson drank a decoction of the plant as a tonic; it was also used by this tribe as a wash for sore eyes, chapped hands, rashes on the skin, and for insect bites. The Creek used a yarrow decoction to cure toothache. The Pequot and Iroquois drank a decoction as an appetizer, also to settle the stomach and to cure a headache. In general, yarrow tea was thought to benefit the liver and kidneys.

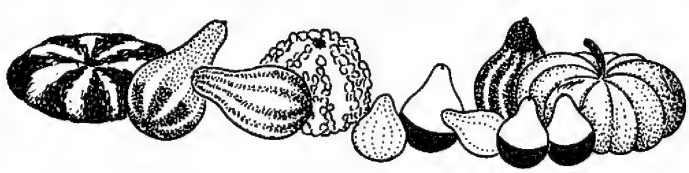
A species of milkweed, *Asclepias,* was used by the Natchez and Cherokee to cure kidney trouble, also syphilis.

Tonics prevailed among the tribes. The Thompson boiled the fresh bark of the service-berry tree, *Amelanchier alnifolia,* and drank the decoction; the bark of the western chokeberry, *Prunus demissa,* was used in the same way. The Chippewa used the rhizome of the sweet flag, *Acorus calamus,* and also boiled the roots of the common dandelion, *Taraxacum officinale,* as tonics. The Creek used goosefeet or American wormseed, *Chenopodium ambrosioides,* as a spring tonic.

The Osage, realizing that the roots of three water plants afforded a steady supply of food, mentioned these plants as symbols of life in the rituals of the Great War Rites: water chinquapin, *Nelumbo lutea;* groundnut, *Apios apios;* arrowhead, *Sagittaria latifolia;* and cedar for long life. Moreover in the Osage Rite of Vigil, grass is lifted toward the setting sun in order to bring the warriors success; in this rite willow saplings are a symbol of life.

An important feature in the Winter Solstice Ceremony of the Zuñi is the presence of the fetish, Ko'loowise, the plumed serpent. To this image, grains of corn and grass are offered. The creature, constructed of deerskin, is five feet long and eight inches through the thickest part of the body; its under portion is painted white, while the back is black and covered with duplicate curves in yellow and blue-green to designate the scales of the serpent. A deerskin tongue, colored red, hangs from the mouth which is provided with teeth. Plumes stand from the top of the head, which is made from a gourd.

Outstanding, however, is the smoking of tobacco, *Nicotiana,* among the early Indians, a feature in magic, councils, treaties, and most religious ceremonials.



"DIVINE" LEAVES OF THE INCAS

By DAVID J. ROGERS

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Bolivia, Department Nor Jungas. Prominent features of the landscape are the cleared, terraced fields for coca-growing. The elevation is about six thousand feet.

COCA MEANS MANY things to different people. To some of the early Spanish padres who first saw coca leaves used by the Incas it was evil (and it is to some people today); to ancient and modern Indians of the high Andes, it is "divine"; to the Conquistadors and their followers, it meant a profitable trade and a higher output of labor from the Indians forced to dig in the high-altitude gold mines. Today coca cultivation means a good income for a few ruling class families who have "organized" its production and sale.

We cannot make decisions on the "good" or "evil" of coca use in the light of present knowledge. Most such attempts are based on observations alone, and little controlled experimental work has been done. We do know that an extract, cocaine, from the leaves of coca (*Erythroxylon coca* Lamarck) can be a habit-forming narcotic when used intemperately, but we do not know that the leaf itself, when used as the Indians use it, is habit forming. There are, to be sure, people who "habitually" chew the leaves, but perhaps in the same sense that people habitually use aspirin for headaches!

Erythroxylaceae is a family of flowering plants found in the tropics of both hemispheres. Of the two genera in the family, *Erythroxylon* is by far the largest, with approximately two hundred species in both the Old and New World tropics. The two species that may be chewed (*E. coca* and *E. novogranatense*) are found only in the Western Hemisphere, except such plants as may have been transported and transplanted to conservatories in Europe or to the Eastern tropics.

Going from west to east over the high Andes, one passes through the sierras by car or by plane over them; descending the eastern slopes of this mighty chain of mountains, he is struck with the fact that there seems to be only one predominant cultivation endeavor. On the side of steep slopes or on the brows of ridges, at altitudes between about two thousand and six thousand feet, large cleared areas can be seen. These are the beautifully prepared, steplike terraces of the coca plantations, called *cocales*. Nor is this local; the same type of plantings may be observed all the way from Bolivia in the south to Colombia and Venezuela in the north of South America.

The mature plants in the *cocales* usually reach a height of five to six feet, and may occasionally be taller. The shrubs appear rather gaunt; if seen shortly after harvesting, they seem on the verge of death, having been nearly defoliated. On many of the plants one may find a species of reindeer lichen (*Cladonia* sp.), which adds to their sere appearance. Harvesting may begin when the plants are two to three years old and continue for about twenty years. Leaves may be harvested from three to six times a year, for in the montaña the rate of vegetation growth is phenomenal. Here clouds moving westward deposit moisture drawn up from the vast Amazonian lowland to the east. The "dry" season is that period when it usually rains only once a day.

Methods of cultivating and harvesting the crop have not changed since prehistoric times. The rather beautifully designed, simple leaves, with two veins that parallel the midvein on the under surface, are picked by hand when they are mature and about an inch long, and carried to smooth, flat drying areas. Formerly these were made of sun-baked clay, but today they are usually constructed of concrete. Great care is taken to protect the drying leaves from moisture, for damp leaves would ferment—a process which would tend to destroy the active principles, the alkaloids. After harvesting and drying, the leaves are placed in a huge

Young plants of coca, *Erythroxylon coca*, about two years old, on the terraces near Coroico, Bolivia.

A dried leaf of coca, showing the characteristic three major ribs.

wooden screw press which compacts them for shipment to the markets. The leaves I saw being pressed were usually baled in one-by-three-foot bundles, then wrapped in white cotton cloth for transport. It seems important that there be little delay in the steps between harvesting and marketing, as apparently there are volatile substances in the foliage which escape if the leaves stand too long before being used. Although some coca may be consumed by those who raise and harvest the crop at the lower elevations, the greatest proportion is transported by truck, burros, llamas, or on the backs of the Indians to the high-Andean centers of Indian population.

By far the largest quantity of coca goes into commerce in the form of the freshly dried leaves, but some is diverted to governmentally controlled extracting factories where the cocaine is removed. Agricultural statistics for South America are generally more estimated than actual, and those for areas east of the Andes in the montaña of Peru are less reliable than those for coastal zones nearer the large population center of Lima. However, the most recent estimates indicate that about ten million kilograms of coca leaves are produced annually in Peru alone. In this area, about forty thousand acres are cultivated, but this does not include some more or less abandoned *cocales* whose productivity has fallen below a point at which it is commercially feasible to harvest. Such *cocales* are allowed to revert to bush, and the older plants may persist for a long period beyond the time when they are actively cared for. This type of agriculture, with its shifting areas, has caused much confusion to botanists investigating the origins of the cultivated coca. Surviving plants from the abandoned *cocales* may give the appearance of wild plants, although they once may have been meticulously cultivated. Nine-tenths of the harvest is home consumed, and the remaining tenth is sufficient to satisfy the needs of all the rest of the world.

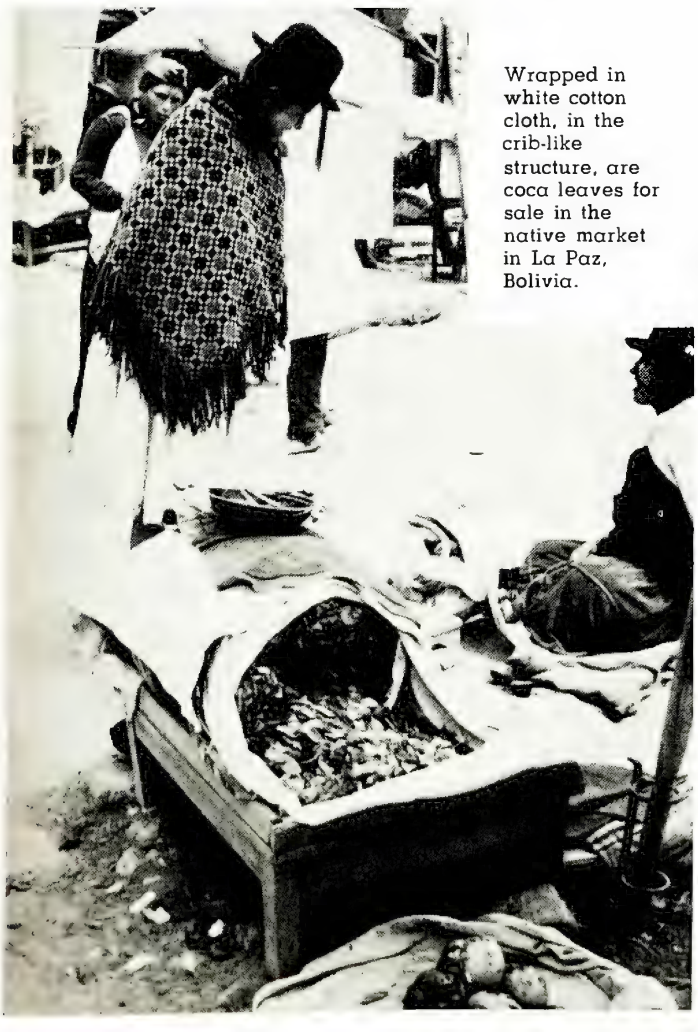
A common sight in the street markets of La Paz, or other cities with great Indian populations, is an Indian woman vending coca leaves, and nearby another woman selling small grayish cakes of lime *(llipta)* which are almost universally used with the coca. Although varying quantities of coca leaves are shipped abroad, where drug companies extract cocaine, the use of the whole leaf does not seem to have spread far from the areas where the plants are grown.

Many scientists have noted that primitive societies the world over, separated from others by mountains, oceans, or other barriers, have independently managed to extract from the plant kingdom various materials which tend to ease their pains or allow escape from an overburdensome world of reality. Thus, in the Near and Far East opium and marijuana were developed; in tropical Asia and the nearby islands betel nut became prominent; in Mexico and our own Southwest peyote, or mescal, was favored. There are many others, all developed long before recorded history. Furthermore, in addition to discoveries of drug-bearing plants, procedures or methods of use have developed which are similar in widely separated areas. For instance, in order to obtain the greatest benefit from the use of coca, the Indians add a little lime to the leaves they chew (or allow to rest in the cheek) to assist in the release of the active principles. Apparently the chemistry is such that an alkaline solution of saliva makes the drug substances more active. Almost identical in process is that of betel-nut chewing in Polynesia and southern India. Details of the actual use vary, but the basic idea is the same, for here, too, lime is a necessary adjunct. The betel nut, from a species of palm *(Areca),* is wrapped with the lime in leaves of a vine which is a member of the plant family *(Piperaceae)* that includes black pepper.

In 1901, W. G. Mortimer published a monumental work, *Peru, History of Coca,* which is still the definitive study of the plant. Writing in semipopular style, he has done more than anyone to bring together the early literature on the "divine" plant of the Incas. In addition to his own studies (as a medical doctor), Mortimer received considerable assistance from Dr. H. H. Rusby, Curator of Economic Bot-

A coca press in Coroico, Bolivia, the locality where Rusby's studies were made. The dried coca leaves are compressed with this wooden screw and then baled for shipment.

In the native market in La Paz, Bolivia. The limestone or *llipta* cakes, used by natives when "chewing" coca, are made from either crude limestone, crushed and moistened, or from wood ashes.



Wrapped in white cotton cloth, in the crib-like structure, are coca leaves for sale in the native market in La Paz, Bolivia.

any at The New York Botanical Garden, who spent over a year in the Andean regions studying both the plant and the way in which it was used. Both men were convinced that the manner in which the Indians used coca was not harmful, but was actually beneficial in adjusting to high altitudes.

There is little doubt that coca was used by the ancestors of the great Inca civilization in western South America, although we have no good estimates as to how long that use predated the Spanish Conquest. In 1917, W. E. Safford, an economic botanist for the United States Department of Agriculture, wrote that along the Peruvian coast he found mummy bundles—some dating back two to three thousand years—in which the dead were buried with sacks of coca leaves and accompanying lime containers. So far no records have been found to indicate that coca was used in other areas of the world.

One of the earliest chroniclers for the Incas after the arrival of Pizarro's band was Garcilaso de la Vega, whose father, a Spaniard, arrived shortly after the Conquest and whose mother was an Inca of high birth. From his mother's side, Garcilaso inherited *cocales* which were first established in 1197 and were located on one of the tributaries of the Beni River in Bolivia. The early Conquistadors, notorious for their ignorance of forces other than arms, at first banned the use of coca leaves because they considered it a pagan practice. Later they revised their opinions and not only permitted it, but took control of the plantations and derived much wealth from them. The church leaders, who were active in another aspect of the pillage of Peru, soon shared in the profits from the *cocales*.

Although the Spanish were interested in coca as an item of commerce and coercion to get more gold from the mines, they apparently took no interest in the scientific study of the plants or of the leaves. It remained for the Swiss botanist Joseph de Jussieu to collect the first samples in the early 1700's, two hundred years after the first landings in Peru. Jussieu returned the specimens to the Natural History Museum in Paris, where they were classified by Lamarck, who gave the species its name. Jussieu spent many years collecting in western South America and endured considerable hardship. One of his trips took him to one of the most famous areas of coca cultivation—Coroico, Bolivia—where Rusby was later to study, and where I made observations for this article.

Other botanists followed Jussieu, and some made specific studies of coca, its cultivation, and its use. Among these were H. A. Weddell and R. Spruce—both made contributions to the botanical knowledge of the plants. Chemical studies of the active principles in coca leaves were not made, however, until the middle of the nineteenth century, when scientific interest in plant chemistry began to develop. A. Niemann discovered an alkaloid, cocaine, in coca leaves in 1859. Apparently the first medical publication of the extracted substance was made by a German physician, Dr. Carl Koller, when in 1884 he used cocaine in eye surgery.

According to analyses made by Rusby in his studies of the leaf, several other alkaloids are present in the coca leaf which may be more important than the cocaine. Indeed, states Rusby, the Indians prefer leaves which are less "bitter," indicating a lower content of cocaine in some leaves than in others. In spite of these studies, however, knowledge

of the effect of the coca leaf as used by the Incas and their descendants in the high altitudes of the Andes is still clouded in ignorance. Several hypotheses on the effect of cocaine in diminishing appetites, in assisting in respiration, and in other pain-reducing effects are available, but there are few supporting experimental works.

One erroneous idea which persists today is that coca use lowers the mentality of those who chew the leaf. It is difficult to defend this type of statement, because it does not take into account the fact that the nutrition of the users is very poor, that they live in an atmosphere of reduced oxygen levels, and that many are forced to labor under the most adverse conditions imaginable. The socio-economic situation of the Indians also plays a role in these matters.

Another possibly erroneous idea is that coca, *as used by the Indians,* is a noxious habit. Though there is little direct evidence that the coca leaf does not produce a habituating effect, several observers have noticed that when Andean Indians move from the high altitudes to lowland areas, they give up coca. This would tend to show that chewing the leaves is not habit forming, but again it must be emphasized that this is tenuous evidence. On the other hand, the positive statement that the use is habit forming is no better supported.

Thus, it is extremely difficult to formulate and carry out sound scientific experiments to determine the real role of coca in the lives of people who find some relief in their "divine" plant.

Llipta cake in a characteristic form, as sold in the La Paz native market. (The scale is metric.)

FRUITS AND VEGETABLES IN HAWAII

By MARIE C. NEAL

Miss Neal is Botanist of Bernice Pauahi Bishop Museum in Honolulu, Hawaii. She is the author of *In Gardens of Hawaii,* a revised edition of which is soon to be published.

THE FIRST SETTLERS in the Hawaiian Islands, it is surmised, were one canoe-load of Polynesians who arrived about 500 A.D., after they had braved a long voyage, possibly a distance of twenty-four hundred miles from Tahiti. About six hundred years later, and again an additional one hundred and fifty years thereafter, two more Polynesian groups made the voyage from the south; they are believed to have been the only other people who succeeded in immigrating to Hawaii before the white man came. But others may have tried and failed. In 1778, when Captain Cook discovered the Hawaiian Islands, the native inhabitants were estimated to number about three hundred thousand, and they had become a distinct branch of the Polynesian race, the Hawaiians.

The first group to arrive in Hawaii probably found few edible plants and those small or meager, including perhaps some coconuts, bananas, yams, and young or succulent leaves and stems of a few kinds of edible plants; fruits of pandanus, loulu palms, native raspberries and cranberries; ferns, fern roots, and seaweeds. The only mammals present were a native rat and bat. Land and sea birds were numerous, and fish, molluscs, and other sea animals were doubtless plentiful and a main source of food. It is also possible that these pioneers brought with them, in their large catamaran-like canoes, coconuts and shoots or roots of other food plants not grown from seeds, such as breadfruit, taro, sweet potatoes, yams, bananas, and sugar cane.

Following the islands' discovery, ships on trading and exploring expeditions visited Hawaii. In 1820, the first missionaries arrived from New England to teach the gospel and set up schools. Then began a steady influx of settlers, mainly from the States, Europe, and Great Britain. These people of various races and nationalities were responsible for introducing plants and customs from the Western Hemisphere. And later, after 1850, Oriental laborers from China, Japan, the Philippines, and Korea were brought to the Hawaiian Islands to work on sugar cane plantations and in mills, and they were responsible for introducing Oriental plants and customs. Laborers of other races were also recruited, for example, Portuguese and Puerto Ricans. Thus the sugar industry contributed much to the cosmopolitan human make-up of the Hawaiian Islands. As a result, Hawaii, a State since 1959, has become known as the "melting pot."

In the following paragraphs are mentioned many fruits and vegetables now grown and used in Hawaii, which may not be widely known on the mainland. (Some imported items are also included.) These are arranged in an order considered by many authorities as evolutionary, beginning with the lowest plant forms and ending with the highest.

Of more than seventy species of algae which have been used by Hawaiians for food, forty were best-known; comparatively few are offered in the market today. But the natives still go out on the reefs and collect many kinds, though not by tons annually as was still done in the early 1900's. Algae are necessary at ordinary meals and at feasts, to accompany fish, pork, and poi, supplying flavor as well as food; and some are a good source of gelatine. The great demand for certain kinds of seaweeds by Japanese and Chinese is supplied at markets by imported dried algae, such as kelp, from the Orient and California. Many Hawaiian algae are small, and they are abundant on many reefs, as at Waikiki.

Among the most popular kinds of algae (*limu* to Hawaiians) eaten in Hawaii is 'ele'ele *(Enteromorpha)*, a green seaweed consisting of tufts of green, soft, tubular filaments. It is served raw with poi, fish, and meat. Another popular *limu* is *lipoa (Dictyopteris)*, a brown seaweed which has branching, flat lobes with wavy edges. *Lipoa* has a strong spicy odor and when mixed with some kinds of food, as stews and raw fish, enhances their flavor. A red seaweed, *limu kohu (Asparagopsis sanfordiana)* soft, succulent, and branching, is well known and liked for its pleasant though somewhat bitter flavor when served with staple foods. In a bay on the island of Kauai it is cultivated for local use; it is also formed into balls and sent to Honolulu for sale in markets. Three other kinds of red *limu, manauea (Gracilaria), 'aki'aki (Ahnfeltia),* and *huna (Hypnea)* are favored for boiling with squid, octopus, and chicken, resulting in a tasty gelatine. Other more or less cartilaginous seaweeds are also good for flavoring and thickening soups and gravies as well as for seasoning roasted food—pork, sweet potatoes, and fish.

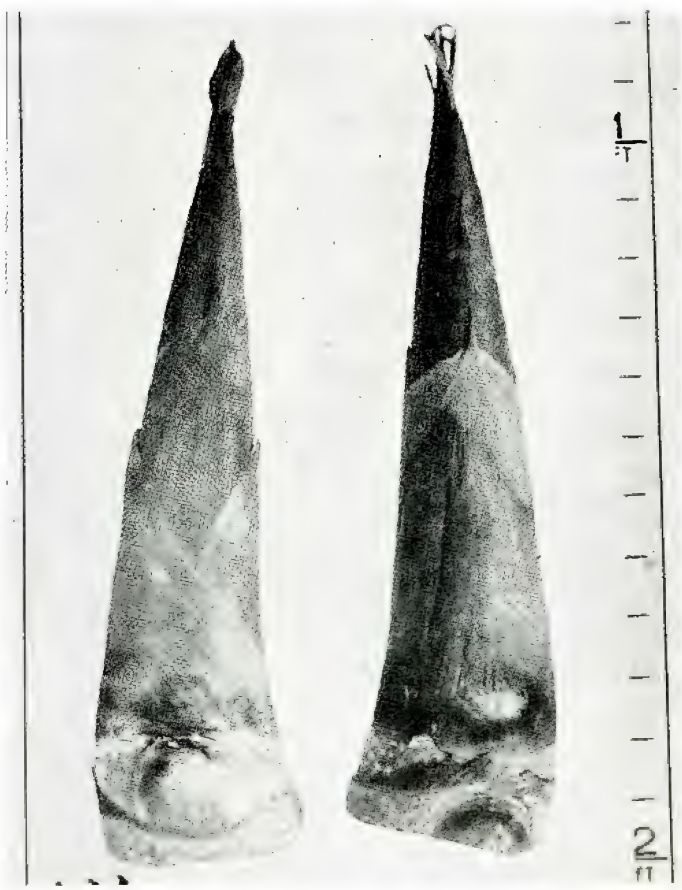
Canned mushrooms and several kinds of dried mushrooms are imported in large amounts. The Jew's ear fungus, *pepeiao (Auricularia polytricha* and *A. cornea)*, gathered fresh in forests on trees and dead logs, is cooked with meat.

Ferns are gathered wild, usually without benefit of markets, and at least one kind is cultivated. They are served as greens and salads, supplying bulk as celery does, but providing little nourishment. A few yield starch. Here are three of the best known of the ten or so kinds used. *Ho'i'o (Athyrium arnottii),* endemic to Hawaii, has large, complex fronds which are eaten raw when young, either with raw fresh-water shrimps or with salted salmon. *Paco (A. esculentum),* native from India to southern Polynesia, is the fern most often used for human food; in Hawaii, it is cultivated by Filipinos who eat the young leaves raw as salad or cooked as greens. *Kikawaio (Cyclosorus cyatheoides),* from Hawaii, has oblong fronds, two to four feet long, with about twenty-four pairs of pinnae. Its roots and young fronds are eaten raw; the grated, salted roots taste like okra.

Hawaii has no native gymnosperms. But the ginkgo *(Ginkgo biloba)*, a large tree from China, widely culti-

Top. *Lipoa*, a brown seaweed (*Dictyopteris* sp.)
Lower left. *Manauea*, a red seaweed (*Gracilaria* sp.)
Lower right. *'Ele'ele*, a green seaweed (*Enteromorpha* sp.)

Bamboo shoots, *Bambusa* sp.



Bread fruit, *Artocarpus communis.*

vated in Japan, North America, and Europe, yields nuts, *pak go,* which are imported and sold in Chinese markets in Hawaii. Their edible seeds are used as a nourishing addition to soup. Also imported are pine nuts, from the nut pine *(Pinus cembroides* var. *edulis),* a native tree of the western States. These nuts are sold in candy stores in Hawaii.

Hala (Pandanus odoratissimus) is a strange-looking, native Hawaiian tree, varieties of which grow throughout Polynesia. Each of its many branches ends in a tuft of long leaves, and from the trunk spread stiltlike, aerial roots. The fruit looks somewhat like a pineapple, a rounded head with many yellow or red sections which, when ripe, fall separately; their inner fleshy pumpkin-like end and nutlike seeds in the outer hard part supply good food. However, they are rarely eaten today.

Chee-koo, the round, yellow tubers of a Eurasian plant, the arrowhead *(Sagittaria sagittifolia),* are grown for food and used in Oriental dishes; in one they are fried with pork flavored with ginger. The tubers are high in starch and protein. The attractive plant grows in water, has long-stemmed, arrowhead-shaped leaves above which rise clusters of white flowers.

A large kind of eel-grass or tape-grass *(Vallisneria gigantea)* is cultivated in Hawaii and eaten as a vegetable by Filipinos. The plant is submerged and stemless, and has tufts of long, thin, narrow leaves.

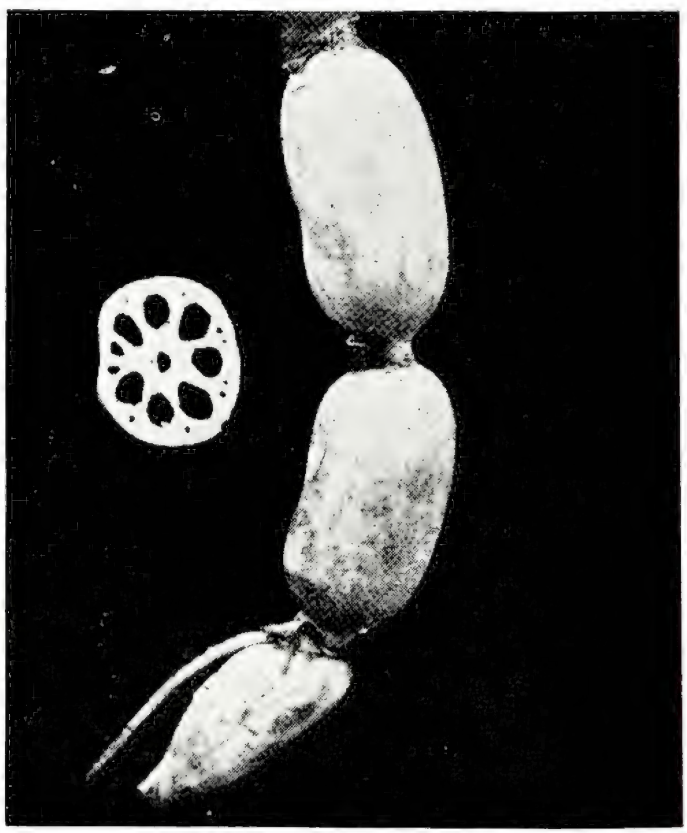
Grasses produce the staff of life for man, especially notable being the major cereals, wheat, rice, corn, and they also supply much of the forage for flocks and herds. Bamboos are woody grasses, including shrubs and trees, some of which have edible parts, such as the young shoots or stalks of several species of *Bambusa* and *Phyllostachys.* These shoots are cut off from the parent root below the ground, when they are six to ten by two to five inches. The shoot has a tender core; this, when sliced, is added to the Japanese dish sukiyaki and also to different kinds of Chinese dishes. The smooth, tender, bland-tasting slices add an interesting variety of texture to dishes of crisp or juicy vegetables mixed with tasty meat and gravy. Canned shoots imported from the Orient are sold in quantities in Hawaiian markets. The fresh local product is also on sale, but needs time for preparation, for it must be soaked in water several days to remove the bitter taste.

Rice *(Oryza sativa)* is an annual swamp grass, about three feet high, which originated in southeast Asia. It is the chief food of more than half the people in the world and is extensively used by people in Hawaii whose forbears originated in southeast Asia, as well as in Japan, the Philippines, and Malaysia. Rice is said to have been introduced to Hawaii in 1856, and soon it became a crop second only in importance to sugar cane. Now little is grown, the greatest supply coming from the mainland. Rice grains are also made into fermented liquor, such as the sake of Japan.

Another indispensable grass is sugar cane (*Saccharum officinarum* hybrid), yielding one of the most valuable plant products known, sugar. In Hawaii, where it is the chief crop, it is called *ko.* Besides sugar of different kinds, one of the by-products, molasses, is so abundant that it is fed to livestock; ranchers put unlimited quantities of it in troughs and mix it with feeds for their cattle. During World War II, yeast was grown on molasses and became a valuable supplementary human food. Stalks of cane in short lengths can be bought at some markets, and after the hard outer covering is peeled off, the solid juicy pulp remaining becomes a generous-sized stick of candy for children.

Lemon-grass *(Cymbopogon citratus)* is a tufted perennial grass which has leaves to three feet long and half an inch wide. It probably originated in or near India. Since prehistoric times it has been widely grown for the lemon-like odor and taste of its oil-bearing leaves. In Hawaii Filipinos cultivate *C. citratus* for flavoring food, such as chicken. Hawaiians, who call the grass *lukini,* use it not only for tea but also add it to bath water. In Europe it is grown to supply a perfume substitute for attar of roses.

Lotus root, *Nelumbo nucifera.*



Ears of sweet corn *(Zea mays)* are sometimes available in the market. Though the crop is now a minor one, corn has been grown in Hawaii for more than one hundred years, succeeding best at altitudes above four thousand feet.

The water-chestnut, *matai (Eleocharis dulcis)*, a sedge from India, bears small, edible, underground tubers. Thin, dark skin covers firm, white pulp which is a popular vegetable, raw or cooked, and adds crispness and a mild nutty flavor to Chinese dishes. Tubers imported from China are sweeter than those raised in Hawaii; canned tubers are also imported. The plants grow in water and look somewhat like green onions.

The Palm Family includes many trees which provide food products, the most useful in Hawaii being the coconut-palm *(Cocos nucifera)*. Date-palms *(Phoenix dactylifera)* are grown for ornament, few for fruits. The betel-palm *(Areca cathecu)*, the nuts of which are chewed with betel pepper, is rare. Today several kinds of palms, among them royal palms *(Roystonea regia)* and the coconut-palm are the source of "millionaire salad." The terminal leaf-bud of felled trees is eaten raw as salad, like celery. Coconuts offer both food and drink. Young nuts supply a pleasant drink, their custard-like pulp is well liked and is also a good food for babies. Ripe nuts, grated, yield a delicious creamy milk and also an oil. The spongy pulp in sprouting nuts is a choice food.

Taro *(Colocasia esculenta)* has been the Hawaiians' staff of life since the first Polynesians brought it to Hawaii. It is an aroid with heart-shaped leaf-blades borne on long leaf-stems which rise from underground tubers. The tubers are baked or boiled, mainly for poi which is made by pounding the cooked product with water into a paste. Poi is eaten alone or with baked pork, fish, and seaweed. Poi and cooked taro are excellent carbohydrate foods and supply minerals and vitamins A and B. The color of taro pulp ranges from white to gray, yellow, and reddish. Bread is made in bakeries with taro flour. Cooked taro leaves, especially those of a Chinese variety, are good greens. Of the two types of cultivated taro, the wetland is grown in marshy land, the upland taro in uplands which have considerable rainfall. Hundreds of forms of taro were formerly known, few are known today. Besides tubers and leaves, taro shoots and leaf-stems are eaten.

Some people cultivate another aroid solely for greens, *belembe (Xanthosoma brasiliense)*. This plant from the West Indies was recently brought to Hawaii from Tahiti.

The pineapple *(Ananas comosus)*, believed to have originated in Brazil, has become Hawaii's largest crop second to sugar cane, though off to a successful start much later than cane. In recent years at least, Hawaiian pineapples are said to lead the world in quantity and quality. Other products from *A. comosus*, besides fresh and canned fruit and juice, are syrup and bran (feed for stock), alcohol, citric acid, fertilizer, and fiber.

The Lily Family, *Liliaceae*, is represented in Hawaii by onions and their relatives, the long, tender leaves of the green onion being essential in many Oriental dishes. A flavoring for Chinese food consists of dried buds of the yellow day-lily *(Hemerocallis flava)*, called gold-vegetable. Fresh buds are added to salads or cooked with meat or soup, substituting for carrots. The *ti (Cordyline terminalis)*,

Soursop, *Annona muricata.*

a woody lily found in Hawaii westward into tropical Asia, has branched or unbranched, slender, ringed stems, each tipped with a cluster of narrow, oblong leaves, one to two feet long. The common form of *ti* with green leaves bears lilac-tinted-flowers in large panicles. The large, white, sweet root yields a high-grade, colorless brandy, called *oke*, short for *okolehao*.

From the beginning, the yam *(Dioscorea alata)* was commonly grown by the Hawaiians, and it was sought by early traders and explorers as food supply. Nowadays little of this crop is grown. *D. alata*, a vine with quadrangular stems and heart-shaped leaves, dies back annually after developing underground tubers. These have a white, bland-tasting pulp.

The commonest edible bananas in Hawaii include many forms of a few species of *Musa*. Banana crops are usually satisfactory, because the fruit ripens all year and diseases and pests are rare. But wind storms are destructive to these weak-stemmed, large-leaved herbs. The Chinese banana, small and stocky, is the kind most commonly grown in Hawaii and the only one raised for export; the fruits are usually eaten raw. Some taller forms bear fruits which are eaten cooked, and still other tall forms bear fruits which are eaten raw; among the latter are 'Bluefields,' apple, red, ice cream, and striped, many of which are grown in tropical America. All these carry their fruits on a downward-pointing stem. But the fehi banana has an erect-fruiting stem; its fruits must be cooked.

Commercial ginger *(Zingiber officinale)*, a valuable root spice which originated in southeast Asia, is grown in Hawaii largely for flavoring Chinese dishes, sometimes for the manufacture of ginger ale. *Mioga (Z. mioga)* a native of Japan, has conical flower-heads which are sliced and added to soup for flavoring. The roots of turmeric *(Curcuma domestica)*, another ginger, furnish a medicine and yellow dye valued by Hawaiians.

(Continued on page 223)

"PAPA MOIN FWANCAIS, MAMA MOIN AFWICAINE"

By JOHN BROWN

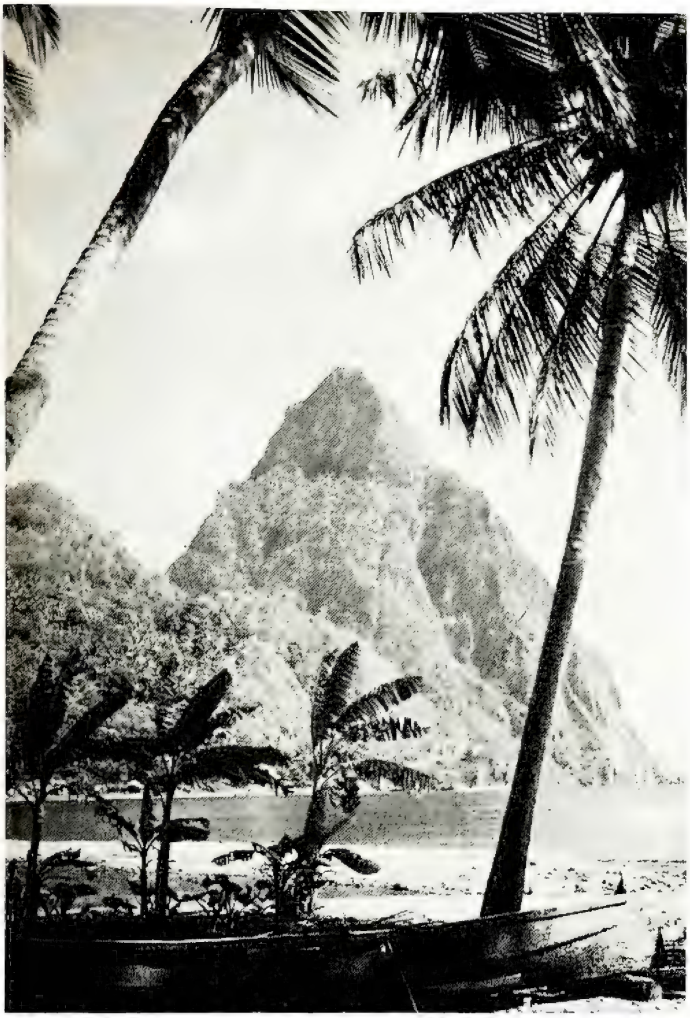
John Brown, a resident tutor in the West Indies for a number of years, was truly interested in the history, the people, and the plant life of the islands. He has compiled and published several pamphlets of poetry, stories, and articles by local talent. He is now teaching in a school in Devon, England.
Dr. Richard A. Howard, Director of the Arnold Arboretum of Harvard University, who became acquainted with Mr. Brown some years ago, received the following article from him at Christmas, 1962, and suggested publication after documentation of the plants involved. Dr. James Clarke of St. Lucia secured the plants which were identified by Dr. Howard.

COMING OUT OF THE SUNLIGHT, it was hard to see within the dark rumshop. Then an old man with a brown face, tattered shirt and trousers, and strong sandals, shuffled on the bare board out of the gloom. Monsieur Joliffe Poleon, bush-doctor, reputed obeah man, whose powers and experiences are legendary in St. Lucia. He stood in the doorway, his body tired, and ah yes, he was glad to see his friend, Dr. Clarke, the Chief Medical Officer of the island; this was good, but his health, unfortunately bad. It was his heart. He told his symptoms, showed his swollen ankles; and Jim Clarke promised to bring back medicine in the afternoon. And then we wanted to talk about his medicines(?) He eyed me warily. Then he led the way to a small, neglected-looking wooden hut, opened the door, went in, and beckoned us to occupy a couple of dilapidated chairs crammed together."Sit down, white man," he said authoritatively. He was in his inner sanctum now, should I intend any evil against him. He could speak to me safely on his own ground.

The wooden walls were festooned with objects—a crucifix framed in a horseshoe, a long-dead, moth-eaten hummingbird, a faded advertisement for Cecil B. DeMille's film of "Samson and Delilah," a rosary, some cigarette cards of aeroplanes, a few garish-coloured religious paintings, a torn French leprosy poster, a picture postcard of a tourist ship (new), family photos; on a tiny table, the remnants of a much-guttered candle, some old bottles containing cockroaches, papers, things in confusion.

M. Joliffe talked carefully at first, mainly to Jim Clarke alone, mainly in patois. Gradually I was drawn in. It was established I was not an intruder, that I spoke French. He could understand me if I spoke slowly, as I could some of his patois on similar terms. Somehow this made it more friendly than if we both spoke English, the language of the officials. "Papa moin fwancais, mama moin afwicaine." From her he had his knowledge. She had been "toute"—he made gestures of absoluteness—"toute afwicaine," though it transpired she had been born in St. Lucia. He began to talk at ease, his face increasingly mobile and animated. Well, he would take a cigarette, of course, one shouldn't smoke, but life . after all he shrugged, raising and letting his left hand fall, a wry smile of acceptance, for a moment "toute fwancais," crossed himself, put the cigarette between his lips, and looked around keenly for a match. Thereafter he smoked continuously, in comfort, telling us how some doctors had maligned him (luckily I was not a doctor, and he had known Jim and his father for years), but how one doctor, at least, had climbed down sufficiently to ask a cure for impotence. M. Joliffe had advised "Sywop des woches" (a syrup of stones and rocks, probably limestone and therefore a heavy calcium syrup) or "sywop des cawettes" (turtle syrup) from Martinique. Three days with doses, three days without, another three days with doses, and eh, on the third day . . Everyone, apparently,

A beach scene near the town of Soufrière.



The Petons of St. Lucia are landmarks in the Caribbean; one is 2,619 feet high, the other is 2,461 feet high. This is the smaller of the two.

had been satisfied. M. Joliffe then launched into a succession of his own remedies, the nature of the subjects no doubt representative enough of the interests of his clients.

As an aphrodisiac, he recommended "bois bandĕ" *(Richeria grandis - Euphorbiaceae)*, folded and mashed up, boiled with "bwigot" (conch or lamphrey) in wine. Strain, add brandy, and take one tablespoon three times a day. For "maladie garcon," the contemptuous local term for gonorrhoea, take a plant called "Marie poui," also named "man better man" *(Achyranthes indica Amaranthaceae)*, fold and cut in pieces. Then go to a white cedar tree *(Tabebuia pallida Bignoniaceae)* and say, "This is for my cure," at the same time giving the tree a lash with a cutlass. Lift the bark, take a piece three inches square, and put this with everything else in a jug of water. If this is drunk for a month, it is guaranteed to drive out all infection. "Man better man" is also effective for abortion. Mash five plants and prepare in unsweetened wine, with nutmeg *(Myristica fragrans Myristicaceae)* and three tablespoonfuls of epsom salts. Epsom salts, we found, was a fairly staple ingredient in M. Joliffe's African medicine.

He collected many of the plants close to his hut for us. "Vin vin lache rat" *(Piper sp. - Piperaceae)*, a plant whose tips resembled rats' tails, for instance, is advised for excessive menstruation. Cut the roots, chop in pieces, fold the entire plant, and pound all together. Put everything in a bottle of white vinegar, boil together with a grain of washing blue, strain, and when cool add two tablespoons of starch. Stir and drink three tablespoonfuls three times a day. Take also a young pineapple *(Ananas comosus - Bromeliaceae)* with salt. For "sweet cush," or postpartem fever, boil all together "fondwe sang" *(Teliostachya alopecuroides Acanthaceae)*, "bouton d'or" *(Spilanthe uliginosa - Compositae)*, "gwain noir" *(Blechum brownei Acanthaceae)*, "pistache mawwon" *(Desmodium canum Leguminosae)*, wild peanut, "vin vin cawibe" *(Wedelia trilobata - Compositae)*, "zebwe acouse" *(Peperomia pellucida Piperaceae)*, strain, add rum, and take one tablespoonful three times a day. I could see Jim liked "pistache mawwon" as much as I did.

Take six soft candles, three new one-and-a-half-inch nails, two large teaspoonfuls of pounded resin, put the candles below, the nails on top, and start to boil, stirring as you go. I privately thought this was a pretty sensational beginning to a remedy, but Jim's face was admirably bland. It was the cure for ulcers. Wash the foot clean in tepid water, sprinkle iodoform round the ulcer, and on the middle of it, but do not cover entirely. Put the plaster on lint, cover the ulcer, and keep covered for four days. Take a pint of lime juice *(Citrus aurantifolia - Rutaceae)* (orange juice for women), a pint of sea water, two pennorth of epsom salts, shake well together, and drink three times a day.

I tried to bring round the conversation to treatment of mental disturbances and upsets, for it is common for M. Joliffe to be consulted on family rows and troubles of all kinds. He overlooked—equally blandly—these references to

A forest scene on the slopes of Gros Peton, showing heliconias, *Carludovica palmata* (from which Panama hats are made), bromeliads, orchids, palms, and ferns.

The Joyeux School founded by M. Joliffe for his children.

his non-medical powers, and to soothe mental illness, in general, advised one-half pound of soft candle, six pennorth of alkali, six pennorth of friars balsam (a standard pharmaceutical called compound tincture of benzoin), six pennorth of "bon tranquil" (usually an extract of green leaves as "chlorophyll" in olive oil), one teaspoonful of iodine, one teaspoonful of essence of camphor, and three nutmegs grated. Two of these should be female, one male, and M. Joliffe explained that the male is long, the female round. (Agriculturists on the island later denied it was possible to tell so easily, but admitted that many of the peasant growers seemed to be able to estimate correctly). All these ingredients are boiled, made into a liniment rub, and used after the patient has been given a warm leaf bath.

The smoke rose in the hut, dispersing the many tiny mosquitoes. Outside the sun rose, and the talk grew warmer. He had one hundred and seven children alive, M. Joliffe confessed, with pardonable pride, though he admitted another man on the island had more. As for those dead . . . he shrugged. How did he know they were his? He knew because those who were his had the mark of the "afwicaine." If you put your hand between the anal cleft, you will find, in the European or the Indian, it is flat. In the 'afwicaine," you can feel the bump, the remains of the tail; It is "afwicaine." "They bring the children to me, and I tell them to take their clothes off, and I put my hand there, and I know if it is mine." "But your father . . . he was French," my Anglo-Saxon demand for logic nagged at me. "Ah," he said, "mama moin afwicaine." He made the quick gesture again. "Toute, toute afwicaine."

On the walls were chalkmarks indicating so many boys, so many girls, total 364, dating from the days when M. Joliffe ran the only school in the district. He had formed the school originally, it was said, for his own children—it was hard not to admire a man who could fill a school—others had

(Continued on page 224)

M. Joliffe Poleon on the left, Dr. James Clarke on the right.

CONVERSATIONS ON ECOLOGY VI

The present series started in the January-February, 1963, issue of *The Garden Journal* and will be continued into 1964. Vegetation Management has been the subject under consideration by Drs. Pierre Dansereau, Frank E. Egler, Robert R. Humphrey, and Luna Leopold. In this article Dr. Egler comments on the previous Conversations and brings another dimension to the topic.

Norfolk, Conn.
September 4, 1963

Dear Pierre:

I have read with great continuing interest the two fine recent letters in this series, III by Bob Humphrey on watershed management, and IV by Luna Leopold on planning commissions and the conflict between long-term cultural values and short-term utilitarian values. How significant it is that *vegetation management* cannot restrict itself to *vegetation!* Vegetation is not only the topmost keystone of an ecosystem-ology (call it "ecology" if you wish, but such an ecology is a far, far cry from the "plant ecology" taught three decades ago, and still being taught in too many places). Vegetation is also the foundation stone for the conservation and management of renewable natural resources.

Now I read the manuscript of your own letter, V, and your invitation that I submit another contribution.

In trying to harness my scatter-brained thoughts of the moment, I feel it might be reasonable in this letter to stress the subject of *communication* of vegetation management knowledge, with emphasis on two case histories which I have specifically studied. The professor is a communicator, in that he communicates to his students in the classroom. I have long considered, however, that such communication is one of the easiest of human pursuits, even without university tenure. The professor is without competition on his campus; his charges are usually empty pitchers; and when not empty, always willing to slosh back the same material for the sake of grades and degrees. To the contrary, communication of vegetation management knowledge to society at large, if in the face of such opposing unwisdom as may be disseminated by radio, television, and the press, by advertising, and by the public relations departments of industry, is more than a test of one's powers as a communicator. It is a test of the fundamental intelligence of human society. It is the obligation of every vegetation scientist to make his voice heard. A few days ago, I opened a short address with a thought reputedly by Abraham Lincoln. (Can anyone identify it for me?)

TO SIN BY SILENCE
WHEN THEY CAN PROTEST
MAKES COWARDS OUT OF MEN

Among biologists, the most unsilent and courageous man I know is a woman—the author of *Silent Spring*. And at the back of the book are fifty-five pages of references to scientists, most of whom have sinned by silence. We have failed to communicate—where she has succeeded.

But a few comments before my two case histories. Firstly, the problem of the pure versus the applied scientist. I note that Bob Humphrey, referring to the odd era when W. S. Cooper had to put up—all essentially at one time—with him, me, Oosting, Daubenmire, and Buell, indicated that he alone went into "applied" ecology. Whereas you, Pierre, josh me for disregarding the rewarding pursuits of the pure in science, while I piddle with herbicides, trying to educate such vegetational uneducables (my term, not yours) as engineers and vice-presidents of industrial corporations. It is quite true that the pure criticize me for being impure, and the applied criticize me for being misapplied. No, there is no inconsistency in my stand. (Anyway, I always considered consistency a virtue only for those too unintelligent to know when to be inconsistent.) It is quite true that when one holds a position the success of which is measured in terms of timber, or forage, or irrigation water, the world calls him an "applied ecologist," and when he holds a position measured in terms of cultural and intellectual rather than utilitarian values, he is a "pure ecologist." On the other hand, I have never made any such distinction for myself. (I agree, however, that many of our applied scientists are not scientists. They are "applied technicians," routinely following a methodology learned in school, or from salesmen.)

Secondly, you honestly ask me, Pierre, "why . . . did you bother with herbicides when you could strike much higher?" I can answer rather simply, for the first time in print. At the end of World War II I found myself retiring, commencing I should say, and face to face with several acres of unmanageable brush. In empirical desperation I bought some 2,4-D and sprayed the things. They turned brown. Ray Hirt (then head of botany, Syracuse Forestry) visited me, thought I had something worth publishing. I told him that any fool could spray plants and watch them brown. "Yes," he said, as I recall, "but not every fool would publish." I published, and as a result I obtained support for my research for five years. The donor was interested not so much in my data, but in my ideas on stable vegetation types (and I still have a stable peppermint patch to prove the point). By that time, other challenging values had arisen. I found the selective application of selective herbicides the most extraordinary "tool" yet available for manipulating plant-communities for basic research, and thereby testing conventional "plant succession" as it occurs in textbooks, not in nature. I found that reasonable use of these herbicides could revolutionize the vegetation management of more than fifty million acres of rightofways and roadsides, at lower costs and with higher conservation values (though an intra-industry closed circuit of communication has so far prevented the adoption of this scientific common sense, despite the Public Interest). I found that since insecticides are used to modify the insect peaks which modify the forests, and since other zooicides are used to modify the predator populations which modify the rodent populations which modify the vegetation types, the entire pesticide problem is pertinent, and thus Dr. Rachel Carson's recent book is second to none in its importance to vegetation management.

This is why I bother with herbicides. (Besides, it is a lot of fun, and is an outlet for my urge to meddle with nature, to counterbalance my scientific and cultural interest in Natural Areas. Natural Areas, also, are an extremely important "tool" in vegetation management.)

The first of my two case histories on communication concerns ragweed. Ragweed often occurs on roadsides. Ragweed often causes hayfever. Thus ragweed control has become a profitable industry, especially if associated with a planned obsolescence, i.e., if the control only controls, and does not permanently eradicate ragweed. Now there is no disagreement among botanists on ragweed. The plant is a "pioneer" species, growing on poor or bare soils, often dominating other such pioneers. It germinates continuously through the season, and seeds remain viable in the soil for many years. It is "successful," as plants go. Furthermore, the Ragweed Community is successful on—among many sites—the Ragweed Belt of many highways, that narrow band of salted and oiled rubble at the margins of our roads. A spraying with an herbicide does kill the ragweed, together with its competitors such as plantain, opening more soil to more ragweed, to more spraying. Ragweed is not a "disease" in itself. It is a "symptom" of a site disease. The best way to control ragweed is to eliminate the Ragweed Belt; and this is being gradually done by highway-men, though I suspect not purposively. More and more highways are being constructed with berms and curbs, which separate the pavement from a deep-soiled, well-vegetated area. No strip of rubble—no ragweed.

In 1958-59 I made a survey of two hundred "social units" concerning roadside ragweed control knowledge.* The social units included federal, state, provincial, county, and municipal governments, industry, and citizen organizations. The knowledge was segregated as blue line (the scientific information mentioned above) or red line (repeated spraying of the ragweed belt). Communication itself was recognized as arising from, or going to, various social units, either actual or as recommended by the units themselves. This information was charted, and I need say little more than that the red-line information overwhelmingly dominated, often arising in the industry-sustained Weed Control Conferences, moving in and out of government agencies, parroted by many citizen groups, sometimes going round and round, doing little more than chasing a pointless tale. Blue-line information? "To sin by silence . . . ." Where are the communicators?

The second of my two case histories on communication concerns the gypsy moth. Now this notorious pest was introduced a century ago with uproarious results. I have seen hundreds of acres of oak forests as bare in midsummer as in midwinter. A dozen or more parasites and diseases were successfully introduced. These and native species have now reached an adjustment with the gypsy moth so that peak infestations are naturally reduced, though not without the violent disruptions which are common to nature. In the meantime, DDT came into use. Profit-making industries combined with the non-ecosystematists (foresters, entomologists, horticulturists, agriculturists, who are concerned only with a few strands of the many-stranded ecologic web) to spray our forests relentlessly, affecting the ecosystem far beyond the points of spraying, far north of the Arctic Circle, and far out to sea. Other controls are in the offing. Timber benefits are not to be confused with total ecosystem benefits.

In 1962 I made a survey of all pertinent "social units" in a northeastern state, concerned with gypsy moth spraying. These units included state agencies, industry, citizen groups, and the actual towns that voted to spray, or not to spray. Blue-line information arose in almost all citizen groups, but failed to communicate itself. Four of five state agencies were essentially blue line, but did no communicating. One state agency was two-phased: it had a slender blue line, beamed winningly to the blue-line organizations; it had a massive flow of red information—and the only such red on the entire chart—directed effectively to the towns, with horrifying warnings that "The caterpillars are coming. If you do not spray . . ." Blue-line information? "To sin by silence . . ." Where are the communicators?

In concluding this epistle of miscellany, focused on problems of *communication of vegetation management knowledge,* I should like to give glancing recognition to questions which are raised by items currently in the news, of interest to both scientist and layman. For example, annual meetings of the Ecological Society of America have just been concluded, held in conjunction with those of the American Institute of Biological Sciences and affiliated societies. The E.S.A. is *the* professional society in America that should be unsilently out in front on the pesticide issue. Yet at the time of this writing, its journal *Ecology* has not yet published a review of *Silent Spring* (though one is in press). The Society has some sort of committee on public relations, and a subcommittee on environmental pollution has been proposed, but to my knowledge it is still essentially undecided as to whether such committees are "proper" (catch the innuendo in my voice?) for proper ecologists. While the E.S.A. prides itself on its propriety, the non-ecologists are making hay, and with more than herbicides. For example, Part III has finally been published of the National Academy of Sciences—National Research Council report on pest control and wildlife relationships. The first two are widely recognized as a whitewash of the problem. This third, on needed research, is a very strange bulletin, very un-specific in details, offending no one, and reading very much like a term paper by a mediocre high school student, discussing varieties of possible research. We must remember that this committee is largely financed by the chemical industry; he who pays the piper has always called the tune, even if under the prestigious emblem of the NAS—NRC. An odd and interesting attribute of this committee (which will surely be noticed by our hammer-and-sickle-bearing criticizers) is that nothing is published without the unanimous consent of all members! The effect is very much like the Russian veto in the United Nations, except that in the UN both minority and majority opinions are freely communicated to the public. Not so from this top American scientific committee, on a subject which has called for a special Presidential review. Did you ask about the freedom of American science and scientists?

Much more could be said. There is the situation where

(Continued on page 224)

*Frank E. Egler. "Roadside Ragweed Control Knowledge, and its 'Communication' between Science, Industry and Society." Proc. IX Internat. Bot. Congr., Montreal 1959, Vol. IIA (Abstracts), pp. 10-11. 1959.

Two native homes and a hand-flower tree, *Chiranthodendron pentadactylon*, combine to create a pleasing picture in the Zapotec village of San Miguel Suchixtepec. The roof of one is made of grass, of the other of hand-cleft fine shingles. In both houses, the roof supports are bound together with strands of the inner bark of *C. pentadactylon*.

"THE TREE OF THE LITTLE HANDS"

CHIRANTHODENDRON PENTADACTYLON

By THOMAS MACDOUGALL

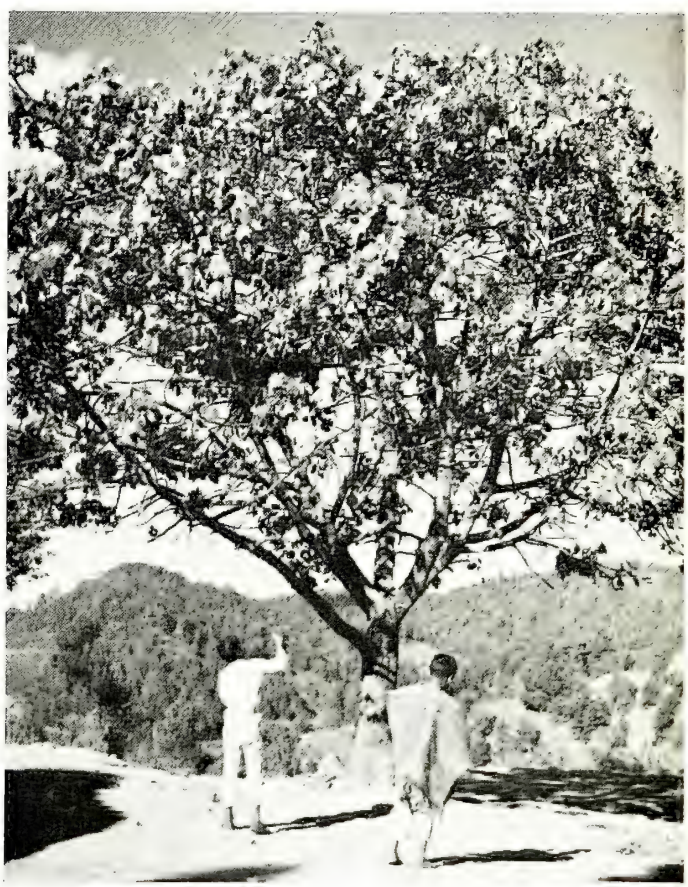
Mr. MacDougall, though past retirement age, still spends much of his time in Oaxaca and Chiapas, Mexico, and continues to make study collections of plants, mammals, and reptiles for institutions and individuals. He is especially interested in collecting *Gesneriaceae*, *Begoniaceae*, and *Cactaceae*. In 1944, Mr. MacDougall was on a six-month expedition of The New York Botanical Garden to Mexico with E. J. Alexander, collecting botanical material, such as would augment the herbarium and further scientific study, and horticultural material, such as would interest growers.

ONE OF OUR interesting and picturesque native trees of Mexico is *Chiranthodendron pentadactylon*. It was famous here before the arrival of Cortes and, to the Nahuatl-speaking natives, was – and is the "tree of the little hands." The flower is said to have been an object of veneration.

The dry flowers are often seen in the herb stands of Oaxaca market places. A syrup, made from sweetened water in which the stamens have been boiled, is considered to be a good remedy for coughs and colds.

Within the State of Oaxaca, *C. pentadactylon* is native to high altitudes on the Pacific slopes, from the borders of Guarrero, southeastwardly, almost to the isthmus of Tehuantepec. I do not know of its occurrence in Oaxaca in areas with drainage to the Gulf of Mexico. The altitudinal range is from six thousand to nine thousand feet above sea level.

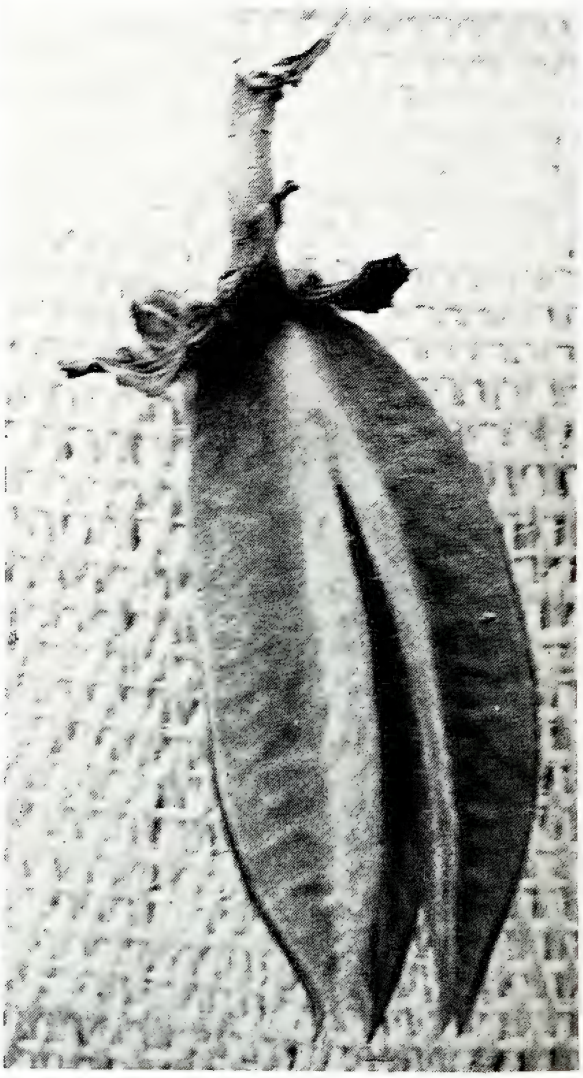
There is a movement in Mexico toward the use of native trees in ornamental plantings—this is not yet noticeable with *Chiranthodendron*. There are trees in Chapultepec Park in Mexico City (which I have not observed), and in a Oaxaca patio grows (or grew) a tree which was a "remembrance" from me to the late Prof. Cassiano Conzatti. In other words, a *Chiranthodendron pentadactylon* tree might be considered a "rare sight."



The abundant liquid in the nectaries of the hand-flower attracts insects and a great variety of birds, including warblers and orioles. Here two Zapotec Indian boys find targets for their sling-shots.

This Zapotec Indian girl, posed against the adobe "stuccoed" wall of her home, holds a bouquet containing open flowers, buds, and a partially developed seed pod of "the tree of the little hands."

A flower of *Chiranthodendron pentadactylon* in the small hand of a child. The rich red stamens, which form the "hand," are the showy part of the flower.



The seed capsule is hard, reddish brown, and about four inches long. The five sulcate valves open to display rows of small, shiny, dark seeds on a "padding" of glistening yellow-brown hairs.

Today, however, the traveling gardener may easily see the hand-flower tree on three newly opened automobile roads: a) along the Yucu-daa, Tlaxiaco, to Pinotepa Nacional road, in the vicinity of kilometer 95; b) along the Oaxaca to Puerto Escondido road, beyond kilometer 180; and c) along the Oaxaca to Puerto Angel road, in the vicinity of San José Pacifico.

In 1946 I sent seeds to Sir William Wright Smith, then Regius Keeper of the Royal Botanic Garden in Edinburgh. In acknowledging the seeds, Sir William commented that the "handflower has an interesting story. The horticultural history of *Chiranthodendron* = *Cheiranthodendron* = *Cheirostemon* in this country is recorded as follows:

" '*Cheirostemon platanoides* — the tree known as the

Two children gather fallen seeds for the author, Thomas MacDougall. Some of these seeds were sown and germinated at the Royal Botanic Garden in Edinburgh, Scotland.

'hand-plant' has never flowered in our collections, although common in them.' *Paxton's Flower Garden,* III. 23 (1852-53)

" 'Happily Charles Dorrien, Esq. of Ashdean, has been more successful, and fine and perfect flowers were produced in his garden in the spring of 1859 from which, by the kindness of this gentleman, our figures have been made.' *Botanical Magazine,* t. 5135 (1859) *Cheirostemon platanoides.*

"In an account of the Second Great Flower Show, June 11, 1862, among the miscellaneous awards is the following: '3rd prize, C. Dorrien, Esq., Ashdean, Chichester—*Cheirostemon platanoides* (hand-plant).' *Proceedings of the Royal Horticultural Society,* II (1862) p. 471.

" 'at Kew it has reached a considerable size in the temperate house.' *Garden,* Jan. 29, 1881. p. 123 (with figure). "Apparently it is now lost to cultivation." W.W.S.

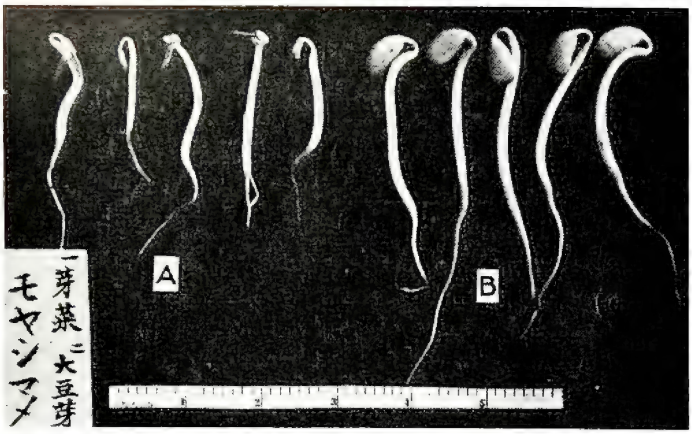
Having read in *Timbers of the New World* that "no wood specimens [of *Chiranthodendron pentadactylon*] are available for study," I asked Dr. Robert W. Hess, then Associate Professor of Forest Products at Yale University, whether he would be interested in examining samples. He indicated his interest, since the "School of Forestry had as yet been unable to obtain an authentic sample," and "wood samples for scientific purposes only" were shipped to Dr. Hess from Oaxaca in the summer of 1947.

A Chontal Indian, from the village of Santo Domingo Chontecomatlán, carries a pack of bark, freshly stripped from young hand-flower trees. The outer and inner barks are separated by pulling the strips through a slot in a board.

Fruits and Vegetables of Hawaii (Continued from page 215)

Vanilla *(V. fragrans)*, an orchid from Central America, bears podlike fruits which are the source of flavoring for food. At one time the industry was attempted in Hawaii, but it did not prosper; however, here and there vines are still growing and bearing their pods.

Kava (Piper methysticum) is a native shrub of Pacific Islands. It is four to twelve feet high and has jointed, green stems and large, heart-shaped leaves. In Hawaii its root has long been valued as the source of a narcotic drink and medicine. For the drink, which is often used in ceremonies, the root is ground up, mixed with water, and strained. Taken in moderation it acts as a stimulant; large quantities induce sleep and may affect the skin. Nowadays the fresh root is gathered and used, as well as a dry preparation sold in bottles. The betel pepper *(P. betle),* a vine from southeast Asia and Malaysia, is grown to some extent in Hawaii for its leaves which are used to flavor Chinese dishes. Also, accompanied by lime and seasonings and wrapped around



A. mung bean sprouts; B. soybean sprouts.

pieces of nuts of the betel-palm, they are chewed for their stimulating effect.

The Fig Family, *Moraceae,* is represented in Hawaii by these fruit-bearing members: a black-fruited mulberry, the common fig (Smyrna and Turkey varieties), and the breadfruit *(Artocarpus communis).* The breadfruit, said to have accompanied early Polynesian settlers to Hawaii, is common here. The tree is some thirty feet high, has leathery, lobed leaves a foot long or more, and bears globose or oblong, green to brown, seedless fruits, about five inches in diameter. The fruits are boiled or baked like sweet potatoes, a thin rind covering sweet, mealy pulp.

The macadamia nut *(Macadamia ternifolia)* from eastern Australia has been growing in Hawaii since 1890. Many orchards have been planted, resulting in a successful industry. The smooth, brown, hard-shelled nut contains a delicious white kernel, which is prepared by roasting and salting as are peanuts.

Rhubarb and beets are grown in Hawaii and sold in the market; also, for greens, Chinese spinach *(Amaranthus tricolor)* and Ceylon spinach *(Basella alba).*

The lotus, or sacred lotus *(Nelumbo nucifera)* from southern Asia lives in quiet, shallow water. Its long-stemmed leaves raise rounded blades a foot or more above the surface, and the fragrant, white or pink, many-petaled flowers rise even higher. The flowers are a well-known symbol of Buddhism. The roots are buried in mud below the surface and produce white or reddish tubers, about two feet long, in the form of links. When sliced for soup, or for combination with meat, each link is seen to consist of substantial starchy material with ten or more continuous longitudinal air spaces. These starchy vegetables are commonly sold in markets of Hawaii. The seeds, contained in a flat-topped receptacle, are also cooked for food which resembles hominy.

Five annonas, all from tropical America, are grown in Hawaii. The commonest, the soursop *(Annona muricata),* has green, softly spiny, irregularly heart-shaped fruits about seven inches long. The white-cottony pulp is saturated with a sour juice which yields a pleasing drink. The four other annonas are cherimoya, custard-apple, sweetsop, and ilama, *(A. cherimola, A. reticulata, A. squamosa,* and *A. diversifolia).*

Many varieties of avocados *(Persea americana* and *P. americana drymifolia),* also from tropical America, thrive in Hawaii. They are grown chiefly for local consumption.

To be continued

PAPA MOIN FWANCAIS (Continued from page 218)

joined, and it still survives as the Joyeux Combined School close at hand. We came out smiling into the noon sun, he took a handful of cigarettes, and I took their photograph together, the two medical authorities of St. Lucia.

In the afternoon, we returned with the medicine. M. Joliffe was still by the rumshop. Not after the ladies? Not at all, the ladies were only too anxious to come to him; he had no need to move. He was moved indeed with Jim's speed in getting him the medicine, put his arm round him thankfully. "Bon Dieu kai beni-ou." "Bon Dieu kai beni-ou." "God bless you," we echoed. He waved at us and turned slowly back towards the rumshop.

"There's a lot of good sense in those remedies, but you know, it was still six pennorth of friars balsam in my father's time. I remember he used to come to the shop and get his supplies when I was a boy. I wonder if he knows you could get ten times as much in those days for a six-pence . . . He doesn't come to town much nowadays . . . You want to try the 'bois bande'? You mostly find it over by Soufriere." Jim laughed at me. I was really thinking about "papa moin fwancais, mama moin afwicaine." Sired by France out of Africa. It might have been an epitaph to the whole island of St. Lucia. We drove back to town in the declining sunlight.

Conversations on Ecology (Continued from page 220)

an agricultural experiment station (chief government prosprayer in the state) holds a field day and invites as its major speaker and expert on pesticides, a man whose qualifications are primarily in public relations for an industry. The newspaper report of his talk was headlined "Pesticides aren't Menace to Health of Human Beings." There is the situation in a state university college of agriculture which has just established a "Department of Environmental Science." It will be interesting to see how agriculturists, with their notoriously short-term non-ecosystem-oriented philosophy, will communicate to the general public in the name of "ecology." It will be interesting to see the reaction of another part of the campus which holds a department of botany which carries on the teaching of plant ecology. And lastly, there is the situation in the nation's newspapers a few days ago when an Associated Press release received such headlines as "Scientist takes issue with Carson," and "Scientist at odds with author; says weed killers necessary." The scientist is a plant physiologist (of a field far removed from ecosystem-ology); the effect of the news release is to put him fairly and squarely with the chemical industry, with their eminent voices, the Doctors Baldwin, Darby, Decker, Stare, Westcott, and White-Stevens. On close reading of the article, however, we find absolutely nothing that was not explicit or implicit in *Silent Spring* itself!

It will be interesting to see whether the ecosystematists communicate to the general public. It will be interesting to see whether the general public will have the intelligence to listen to the ecosystematists when they do speak. The last quarter century has not made an optimist of me.

Sincerely,
Frank

HOLIDAY REMINISCENCES IN THE ADIRONDACKS

By EDMUND H. FULLING

Dr. Fulling is Honorary Curator of The New York Botanical Garden and Editor of *The Botanical Review.*

AN ISSUE of the A. I. B. S. *Bulletin* this past spring contained an announcement that a bryological foray in the Whiteface Mountain and Wilmington Notch areas of the Adirondacks would precede the technical sessions of the Institute in Amherst, Massachusetts, the last week in August. This announcement induced me to visit that area at the specified time, not with any intention of looking for bryophytes, which hardly know me as I pass them, but to visit another mountain top and particular topographic area, for such regions always offer an almost irresistible lure for me.

It so happened that I mentioned this intention one day to a local non-botanical friend whose hobby and recreation consist of hiking and a moderate degree of mountain-climbing. A few days later, in the last hour of agony of packing for his own vacation, he summoned me by telephone and furnished me with a U. S. Geological Survey topographical map of the Mt. Marcy Quadrangle in the Adirondacks, as well as information regarding three lodges in that area patronized by naturalists and non-naturalist hikers. Without these last-minute bits of information, I would have become a conventional tourist in roadside motels; instead, five of the ten days in the region were spent at the Adirondack Loj at Heart Lake, one of the two lodges operated on a family-style-eating, and an open-dormitory-sleeping, plan by the Adirondack Mountain Club. The abbreviated spelling "Loj" betrays the influence of Melville Dewey who, in addition to founding the famous and today extensively used Dewey Decimal System for library cataloguing, also formulated a phonetic scheme of orthography, which has not been adopted beyond such purely local observance. More of a monument to him is the huge and elegantly old-fashioned Lake Placid Club, in the founding of which as a vacation haven for the intellectuals of his day, eighty-five years ago, he was instrumental. Within the Club building, managed today as a high-class hotel for members and guests, Dewey is appropriately honored in various ways, not the least of which is the maintenance of an actively used library, surprisingly large for what today is an essentially social institution.

My accommodations at the Loj were obtained by telephone the day I arrived and coincided with the last day when members of the Sullivant Moss Society were there as part of the bryological foray. Next day, after they had left and I sat on the porch awaiting dinner, Dr. Jablonski entered. We stared at one another, not merely because the meeting was unexpected but principally, at least so far as I was concerned, because we had made a similar unexpected meeting three years ago at the Wildflower Pilgrimage in Gatlinburg, Tennessee. Dr. Jablonski, who was vacationing in the Saranac Lake area, had come to the Loj to become acquainted, for some reason which I did not learn, with a Doctor Phelps. Doctor Phelps then appeared on the scene, and as she and Dr. Jablonski were introducing themselves to one another, I learned that Dr. Phelps is a retired physician, now intensely pursuing her interest in botany, geology, ornithology, and other branches of natural history in the Adirondacks. She is also continuing to climb the peaks of the region, as she has been doing for thirty-five years with intermissions of not more than one year. Not knowing that I had already become acquainted with Dr. Phelps, Dr. Jablonski introduced me to her in his customary friendly manner, referring to me as the person who had described a new species of fir with exserted bracts between the cone scales. Dr. Phelps, thereupon, suddenly disappeared but reappeared in a moment with such a cone in her hand! She had found it after a chipmunk or squirrel had nibbled its base and dropped it to the ground, for fir cones do not ripen and fall intact as do those of hemlocks, pines, and spruces; instead, they disintegrate on the trees, shedding their scales and leaving only an erect central stalk. And Dr. Phelps would not have been attracted by this particular cone, had it not been that on the previous day Professor Ketchledge, a bryologist, had been at the Loj and had commented about such a type of fir cone. The interesting feature of this, so fas as I was concerned, was not merely the finding of the cone as a result of Ketchledge's presence, but also that he is a former student of Dr. Steere and is now on the staff of my undergraduate Alma Mater, the Forestry College at Syracuse University. To this series of coincidences was the additional one of having in my hand at that very moment a copy of *The Garden Journal* containing the recently published biographical account of Dr. Jablonski. A few moments later, after Dr. Jablonski had left, Dr. Phelps read the account and expressed pride in having been specially visited by a person of his accomplishments, repute, and world-wide travels.

In 1932, thirty-one years before these coincidences, I had the good fortune to visit Russia with my wife Marguerite and succeeded in obtaining 16-mm motion pictures of Red Square, of Lenin's Tomb, and of other parts of Moscow and Leningrad, while other tourists in the party were prevented from doing so. At a showing of these films at an evening meeting in Schermerhorn Hall, Columbia University, my projectionist was Dr. Sydney Bausor, an instructor in the Botany Department. One day, three or four years later, when Marguerite and I were motoring through Washington, D. C., on our way to the Skyline Drive in the Shenandoah National Park of Virginia, we were compelled to stop at a certain traffic light. There, crossing the street, were Dr. Bausor and his wife. They were "foot loose and fancy free," and accepted our invitation to join us on our visit to the Blue Ridge Mountains, which constitute the backbone of the Shenandoah Park.

My doctoral thesis on the identification of cultivated fir trees by leaf structure had already been published, in the pursuit of which I had read or been told about aberrant forms

(Continued on page 238)

BROOKGREEN GARDENS

By DOROTHY EBEL HANSELL

"NO ONE FEELS himself easy in a garden which does not look like the open country." Von Goethe's words, written well over a hundred years ago, describes how I felt while walking through the many small, enclosed gardens at Middleton Hall in South Carolina last spring. I was impressed with what Henry Middleton's landscape gardener had accomplished, with the help of one hundred slaves, in transforming the wilderness into an estate in the grand English manner—all this within ten years, in the mid-eighteenth century. I was impressed with the magnolias, hollies, azaleas, and camellias, many of which had been obtained through Middleton's friend, the botanist André Michaux. I was awed by the venerable live oaks, their great gnarled branches almost concealed by Spanish moss, and by the immensity of several specimens—one has a trunk thirty-five-feet in circumference at ten feet from the ground and a branch spread of one hundred and ninety feet. But I did not "feel [myself] easy." I felt hemmed in by the tall shrubs, overwhelmed by the mass of color, particularly of the purplish and rosy red azaleas, and smothered by the Spanish moss draping the huge live oaks.

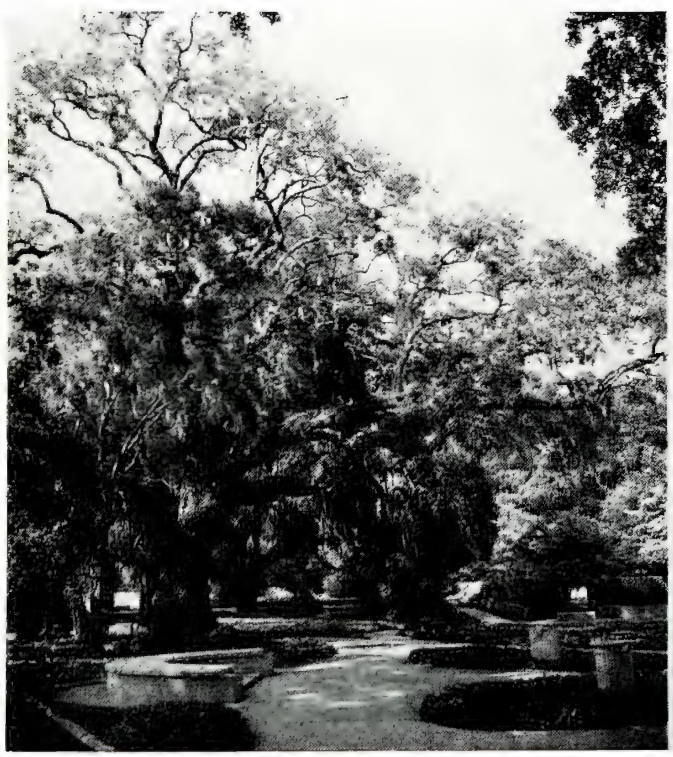
And so I approached Brookgreen Gardens at Murrells Inlet, South Carolina, reluctantly two days later, ill at ease by the very thought of being again surrounded by too many plants, too much color, too little space. Immediately I entered the grounds, I sensed a completely different atmosphere—of repose, of harmony, of spaciousness. Vistas rested my eyes and made me aware of the open country. An open-work wall confines the grounds without creating a barrier between Brookgreen and the surrounding countryside. The red brick used in building this wall was sprayed with cement to give a gray tone which harmonizes with the Spanish moss on the old live oaks *(Quercus virginiana)*.

Brookgreen Gardens are really unique. In 1930, Archer M. Huntington purchased Brookgreen and three adjoining plantations, The Oaks, Springfield, and Laurel Hill as a home and as a setting for Mrs. Huntington's sculpture. (Anna Vaughn Hyatt Huntington, daughter of Alpheus Hyatt, paleontologist and pupil of Louis Agassiz, is a sculptress of considerable note.) But almost at once Mr. and Mrs. Huntington decided to make their newly acquired property a sanctuary for living and growing things as well and to share it with others. Within two years the development of Brookgreen Gardens had progressed to the extent that it could be opened to the public. No architect was consulted on buildings or grounds, the plans were drawn by Mrs. Huntington.

Mr. Huntington incorporated the Gardens, filed deeds transferring the property of approximately ten thousand acres, created a self-perpetuating board of trustees to manage the Gardens for the public, and established an endowment fund for their maintenance. His own words best explain his object:

"Brookgreen Gardens is a quiet joining of hands between science and art. The original plan involved a tract of land from the Waccamaw River to the sea in Georgetown County, South Carolina, for the preservation of the flora and fauna of the Southeast. At first the Garden was intended to contain the sculpture of Anna Hyatt Huntington. This has gradually found extension in an outline collection repre-

With the removal of Spanish moss, *Tilliandsia usneoides*, the gnarled branches of live oaks, *Quercus virginiana*, are revealed, as also the resurrection fern, *Polypodium polypodioides*, which grows on them. These are views along the live oak walk in Brookgreen Gardens.



sentative of the history of American sculpture, from the nineteenth century, which finds its natural setting outdoors. It is not an experiment station nor a research plant. Its object is the presentation of the natural life of a given district as a museum, and as it is a garden, and gardens have from early times been rightly embellished by the art of the sculptor, that principle has found expression in American creative art . . .

"These gardens form the final link in a chain of three wildlife refuges: the first in the Adirondacks in New York consisting of about sixteen thousand acres of forest and lakes; the second at Newport News, Virginia, devoted to the study of the sea which, though smaller, reports extraordinary numbers of birds visiting there and later continuing their annual flight to Brookgreen, Florida, and South America."

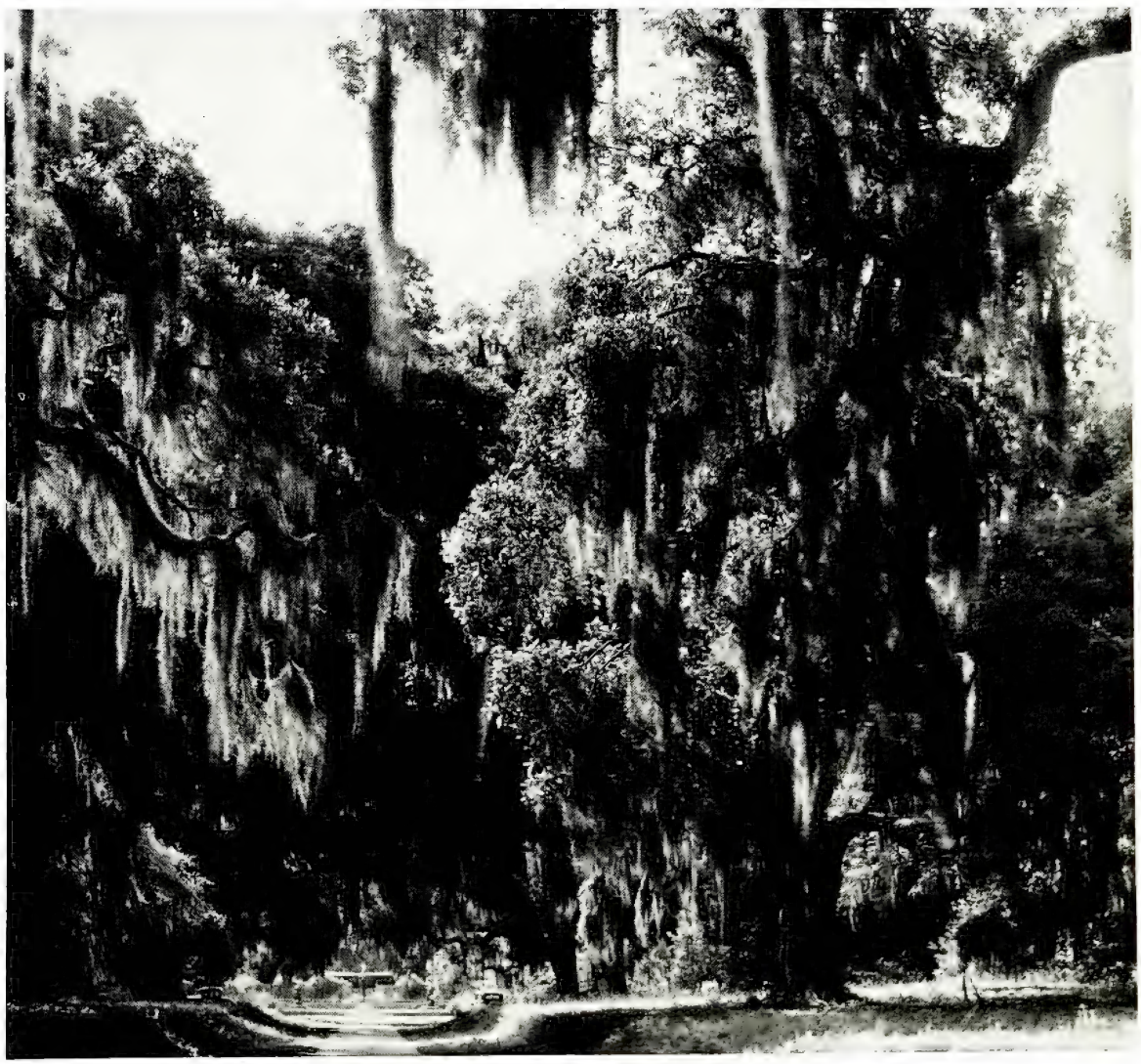
From the moment I walked down the avenue of live oaks, and as I passed from one garden to another, I recognized the feeling of reverence for nature's beauty and bounty that moved Mr. and Mrs. Huntington to develop Brookgreen and the adjacent plantations "for the interest of natural science and of art."

This avenue of live oaks is all the more magnificent since some of the Spanish moss has been removed, revealing the glistening dark foliage, and the shape and size of the branches and the resurrection-fern *(Polypodium polypodioides)* growing on them. Just beyond these live oaks are others from which the Spanish moss has not been pulled. The contrast between the stark branches of the demossed live oaks and the eery effect of those still concealed by Spanish moss *(Tillandsia usneoides)* is most dramatic.

A low retaining wall, in front of the boundary wall of this avenue of live oaks, holds beds in which native wild flowers flourish. I was especially interested in a bed of arrow-leaf ginger *(Asarum arifolium)* and ebony spleenwort *(Asplenium platyneuron)* and another bed of *Trillium hugeri* with its large, dark maroon flowers. Its flowers are fragrant, deliciously so, having the odor of crushed strawberries.

The entire acreage is rich in native plants, for the favorable location between salt and fresh water provides happy homes for many different kinds. There are magnolias, oaks, sycamores, palmettos, cypress, beech, birch, hemlock, pines, hollies, azaleas, franklinia, loblolly bay, *(Gordonia lasianthus),* Carolina yellow jessamine *(Gelsemium sempervirens), Chionanthus virginica, Vaccinium crassifolium,* and many others. (Some exotic plants have been added—those that grow in this South Carolina climate. I noticed a nice specimen of the yeddo-hawthorn, *Raphiolepis umbellata.*)

Frank Green Tarbox Jr., who has been the horticulturist



Spanish moss, *Tillandsia usneoides,* draping live oaks, creates an eerie effect.

"Youth Taming the Wild" by Anna Vaughn Hyatt Huntington was one of the first large stone statues to be given a beautiful setting in Brookgreen Gardens.

of Brookgreen Gardens from its inception in 1931 and Director from 1951 to 1963, transplanted many native plants of the region to the Gardens. He gathered together an interesting collection of holly: American *(Ilex opaca),* and varieties; *I. attenuata,* a natural hybrid between *I. opaca* and *I. cassine;* dahoon *(I. cassine)* and varieties; *I. glabra leudocarpa; I. montana;* myrtle-leaved *(I. myrtifolia);* and yaupon *(I. vomitoria).* Included in the collection are the three varieties of dahoon that Mr. Tarbox found. Most of the dahoon varieties were identified by the late C. E. Kobuski of the Arnold Arboretum.

In May, 1963, F. G. Tarbox Jr. retired as Director. The trustees then appointed his nephew, Gurdon L. Tarbox Jr., to succeed him. The younger Mr. Tarbox has been on the staff since 1954 and the Assistant Director since 1958. He holds degrees from Michigan State University and Purdue University.

The broad open lawns, the avenues and the groves of trees, the walled garden, the palmetto garden, the several pool gardens are the settings for the work of American sculptors from the middle of the nineteenth century to the present day, and in turn are enhanced by the sculpture.

The Memorial Garden, designed and started six years ago, has as its focal point "The Visionaries," which was sculptured by Mrs. Huntington and carved by the late Robert A. Baille, Curator of Sculpture. This is an allegorical representation of the Huntingtons' planning of Brookgreen Gardens. Mr. Baillie designed the ornamental lettering used on the plaques throughout the garden, and established procedures for the preservation of the sculpture in outdoor settings.

The Museum of Small Sculpture permits the display of other pieces; this is an unroofed, vine-covered structure erected in 1932 and enlarged in 1937. All told, there are over three hundred and thirty works by one hundred and seventy-odd sculptors. This comprises the largest outdoor collection of American sculpture.

Connected to the Museum is a one-hundred-year-old frame building—at one time the caretaker's house and moved one half mile to its present location. Here, at the Information Desk, presides Mrs. Genevieve Chandler. From my brief conversation with her I realized how well informed she is on the history, customs, and legends of the area. She remarked that "legend, more entertaining to many than scientific fact, tells how the Spanish moss was named," and then gave me this enchanting legend.

"The Spaniards arriving on Carolina beaches with their billowing sails were greeted by the Indians who ran down to see these strange white birds . . . the first visitors to invade their privacy. A beautiful Indian maid so intrigued an old bearded Don that he made advances she resented. She took to the tree tops to escape him, and while chasing her, his beard caught in the branches. It is still growing."

Mrs. Chandler also spoke about some of the ways in which Spanish moss has been used through the years.

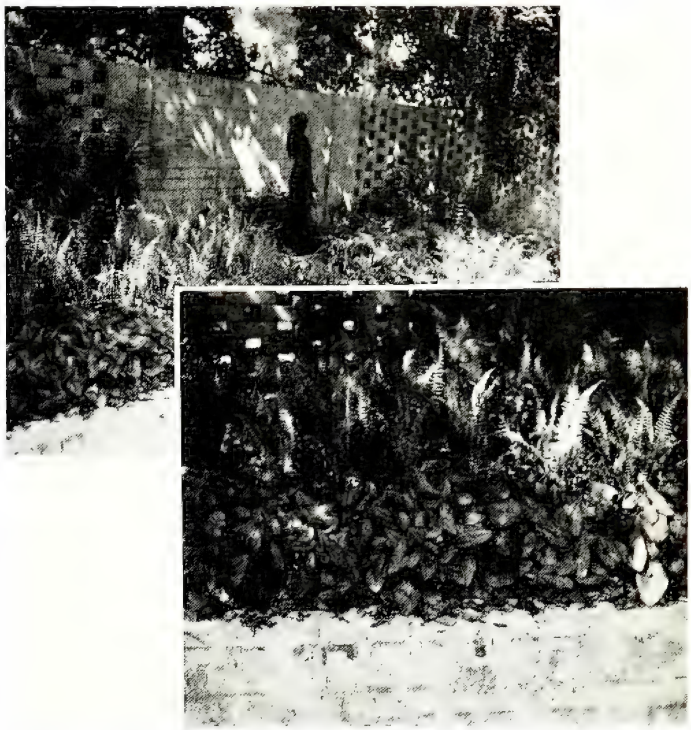
"The Indians, besides wearing hula-like skirts of the moss, slept on it. Some poor folks still do. Cattle survive on it as a diet in March when their improvident owners have gathered too little hay. The cows are saved from starvation by the Spanish moss until the April grass comes in.

"In Louisiana the 'mossers' stand in flat boats and pull the moss with long-handled rakes from the trees in the bayous. It is baled and shipped in carload lots as far north as Canada, where for years it has been used in furniture factories. One woman who worked in such an establishment, on seeing Spanish moss for the first time said, 'For years I've used it for upholstery and wondered how it grew. How happy I am to see where it comes from!'

"In Louisiana the French make a perfume from the small, jade-green, forget-me-not-like flowers and call it 'vertivert.' The first week in June the woods of the coastal section are so fragrant that visitors often ask, 'Have the gardens been sprayed with perfume?'

"Recently," Mrs. Chandler continued, "two very old and old-fashioned Negroes came by and heard some one remark that it was such a pity the moss killed the trees.

" 'No Mam, Missus! I lib wid 'em most eighty years and I never see 'em kill a oak tree yet.' He walked away, and then a thought made him wheel, 'Missus, the moss will bring down the blood plessure. You wear 'em in you shoe. I got 'em in my shoe right now.' "



Upper. "Dawn" by Helen Journeay, set amid ebony spleenwort and heartleaf ginger.

Lower. Close-up of ebony spleenwort, *Asplenium platyneuron*, and heartleaf ginger, *Asarum arifolium*.

When truth outwears, and withered facts grow cold,
When knowledge states with plundered wisdom's gold,
Come gather in the garden of delight.

These words by Archer Milton Huntington are carved on one of the plaques in Brookgreen Gardens.

"The Visionaries," sculptured by Mrs. Huntington and carved by Robert A. Baille, represents the planning of Brookgreen Gardens and is the focal point in the Memorial Garden.

ENJOYMENT OF BONSAI - - and Over-all Care

By JERALD STOWELL

Mr. Stowell, Administrative Assistant to the Executive Director of the United Cerebral Palsy of New York City, is President of the Bonsai Society of Greater New York.

WHILE I WAS growing up in Kalamazoo, Michigan, my father planted a vegetable garden each year. Somehow I was never as interested in the vegetables as I was in growing flowers, which seemed more colorful. In the magazine, *Popular Mechanics,* there appeared, as I remember, an article on dwarfed trees. It was most fascinating. I read and reread this article—and promptly forgot about this phase of horticulture. In 1954, a newcomer to the East, I visited the Brooklyn Botanic Garden. Wandering through the greenhouses, I found the bonsai. I was completely overwhelmed with the trees I saw.

Whenever it was possible during my lunch hour on Welfare Island, where I was employed at the time, I hunted for specimens to train as bonsai. But this method of obtaining bonsai was not very satisfactory. So in 1959 I took a course at the Brooklyn Botanic Garden under Yuji Yoshimura. From Brookfield, Connecticut, I drove to Bridgeport where I traveled by train to New York, then by subway to Brooklyn, one night a week for six weeks. After class I made the reverse trip homeward, carrying my precious creations. I have been growing bonsai ever since.

What are bonsai? Well, they are trees, shrubs, or other plants grown in special containers in a stylized form created by the Japanese. The plants are trained to be an object of beauty, something of nature reproduced in miniature which can be enjoyed in one's home or garden. The plant and the container must achieve harmony, for harmony is as necessary to the enjoyment of bonsai as to the enjoyment of a painting or a sculpture.

There are five basic styles of bonsai: formal upright; informal upright; slanting; semi-cascade; and cascade. Variations, however, are common—a slanting style with twin trunks or a group arrangement with nine trunks.

The selection of material is important. Many believe one must wait twenty or thirty years before he has a finished bonsai. However, with the proper selection of material, a good bonsai can be created within a few hours. Nursery stock or natural specimens with good roots, trunk, limbs, and over-all shape may be used.

The first step is to select a specimen which has possibilities for creating the preferred style of bonsai. Set the tree at eye level and turn it around slowly, looking at all sides carefully to determine the front, the back, and left and right. Bonsai must be pleasing from all sides, although on display it is always viewed from the front.

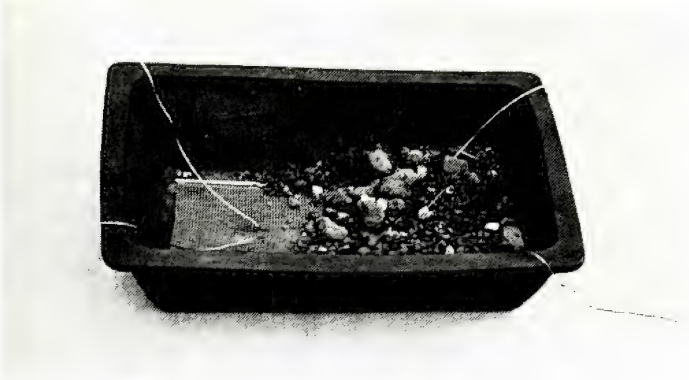
The next step is to trim off excess branches and foliage. At this point, take a blunt tool and dig away some of the soil near the base of the tree to expose the large, heavy roots. In a good bonsai, the spread of the roots is considered very important as it makes the tree appear older.

Now that you have determined the front, trimmed the tree, and exposed the roots, you can begin to wire, which will give an over-all shape to the trunk and branches. The pattern is achieved by winding annealed copperwire around the trunk and branches, starting at the bottom of the tree and running out to the tips of the branches. During the process of wiring the branches are bent to the desired shape. As the wire is bent, it hardens and helps retain the shape given to each branch. Size of the wire is determined by the thickness of the trunk or branch. The copper wire is left on the tree, from six months to a year, depending on how fast the plant grows. After six months or so, the

Native gray birch *(Betula populifolia),* gathered from the woods and grown in a clay pot one year.

Specimen drastically pruned and wired, with the roots exposed.

Specimen being root-pruned, with heavy roots cut, fine roots left.



Container with plastic screen, wires for fastening the specimen, and bottom soil.

woody portions of the branches and stems will keep the new shape; then the wires are removed, but wiring may be repeated as required when new branches grow.

The tree is now planted in its container. Both the style and the color of the container are very important, for neither must detract from the enjoyment of the tree. There are traditional colors for bonsai containers: earth-brown or reddish unglazed for evergreen conifers; blue or gray for deciduous trees; off-white for red-flowered plants and blue for yellow-flowered.

Trees trained in the upright style are placed slightly off-center in oval or rectangular pots; trees trained in the cascade, slanting or windswept style are placed in the center of round or equilateral pots. Trees with tall, slim trunks and delicate foliage are usually planted in shallow, pastel containers, whereas trees with thick trunks and dense foliage are placed in darker, heavy pots and trees with brilliantly colored flowers, foliage, or fruit in green containers.

Once the container has been selected, it is prepared to receive the specimen by covering the drainage holes in the bottom with plastic screen, which prevents the soil from falling through. The plastic screen in no way interferes with watering. Several lengths of copper wire are inserted through the drainage holes to hold the plant in the container. The bottom is then covered with very coarse sifted soil, which provides for good drainage. The potting soil is spread over this—and the container is ready for the tree.

Root pruning is necessary to compensate for the drastic pruning of the plant, and to encourage the growth of fine fibrous roots. One third of the old soil is removed from the ball of roots by means of a blunt stick. The long, loose roots are pruned; however, the fine roots attached to large roots near the trunk are kept to sustain the plant as new root formation proceeds.

As the tree is placed in the container, the wires are pulled around the root ball and twisted until the tree is firmly held in position. Excess wire is cut off, the ends being pushed into the soil. The potting soil is then filled in around the ball of roots so that there will be no air spaces. After the potting soil has settled, brush away any excess and sprinkle fine top soil over it.

Now it is time to add the moss, either sprinkling with powdered moss and pressing it down with a spatula, or using fresh, wet moss. Moss is necessary to prevent the soil from being washed out when the bonsai is watered. Moss also enhances the appearance of the tree, making it look more aged.

After-care of the bonsai is necessary to maintain it in good growing condition. Removal of the wires must not be neglected, otherwise scars will develop—when the wires are retained too long. Fertilizing with weak solutions of "Hyponex" or "Ra-pid-grow" will promote a healthy color of the leaves.

During the hot months of the year watering is a daily chore, as drying-out will kill the plant. During spring and late fall, watering every other day is sufficient.

Once the bonsai has been formed, it should be protected for about three weeks from the hot sun, wind, and driving rain. After the new shoots have begun to grow, it may be placed in direct sun.

In this part of the country bonsai must be protected in the winter, either in a coldframe, cool greenhouse, or cool room.

The best time of the year to begin training a plant for bonsai is in the spring when it comes out of its dormant state. With proper care and training it will develop into a good bonsai within two years.

The deer which lives
On the evergreen mountain
Where there are no autumn leaves
Can know the coming of autumn
Only by its own cry.

Yoshinobu circa 900

The plum-blossom
Which I thought I would show
To my brother
Does not seem to be one at all;
It was only that snow had fallen!

Akahito, 730

The finished bonsai in its container, with moss planted on the surface.

BRIEF NOTES ON RECENT BOOKS

by ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL GARDENING

MINIATURE BULBS. Genders, Roy. 191 pages, illustrated (colored frontispiece), indexed. St. Martin's Press, New York. 1963. $6.75.

A glance at recent gardening titles reveals an interesting subject trend. At least eight of these are devoted to the diminutive in gardens, plants, and flowers—miniature gladioli, chrysanthemums, roses, daffodils, house plants, trees and shrubs, and now, the present volume on miniature bulbs from the prolific pen of a popular British grower and author. American gardeners must not fail to remember that Mr. Genders' recommendations for planting and flowering times of hardy and half-hardy bulbs will not always be applicable on this side of the Atlantic.

1001 QUESTIONS ANSWERED ABOUT FLOWERS. Taylor, Norman. 335 pages, illustrated, indexed. Dodd, Mead and Co., New York. 1963. $6.00.

There is an intriguing fascination to a question-and-answer form of gardening book. One is always tempted to try out one's I.Q. or that of a fellow gardener on a sample run of trial questions. The editor of the famous *Taylor's Encyclopedia of Gardening* has not only furnished adequate answers to 1001 questions about flowers, but with his experienced editorial hand has provided a good index and has grouped the interrogations under specific subject headings, thus making his book a worthwhile reference guide. The contents fall into the following groups: Form and Function of Flowers; The Orchids; Eastern Wildflowers; Western Wildflowers; Older Cultivated Flowers; Cultivated Flowers Today; Flowers from Trees and Shrubs; Some Tropical and Subtropical Flowers.

THE WISE GARDEN ENCYCLOPEDIA: A COMPLETE, PRACTICAL AND CONVENIENT GUIDE TO EVERY DETAIL OF GARDENING. Seymour, E. L. D., ed. 1380 pages, illustrated (part colored). William H. Wise and Co., New York. 1963. $10.00.

This well-known garden encyclopedia, which first appeared in 1936 under the title *The Garden Encyclopedia,* has had several editions and reprintings. This present volume is a reissue of the 1951 edition, which for some years has been out-of-print—the same number of pages and the same colored plates, now decidedly worn and washed-out in appearance. However, the text (which is the important part) contains much helpful information for the amateur gardener. Unfortunately, the data concerning officers and publications of the numerous plant societies is out-of-date.

HERBS

COOKING WITH AN ACCENT; THE HERB GROWER'S COOKBOOK. Gaylord, Isabella. 149 pages, illustrated, indexed. Charles T. Branford Co., Newton Centre, Mass. 1963. $5.00.

According to Isabella Gaylord, there are nine herbs most essential for the kitchen: three annuals, basil, marjoram, and savory; three perennials, sage, thyme, and tarragon; and three old standbys in the vegetable garden, mint, parsley, and chives. Her book is more than just a book of recipes. The text, abounding in dash and wit, is sprinkled with herb quotations from the Bible, Shakespeare, Dioscorides, Culpeper, and the like.

HEALTH FOODS AND HERBS. Hunter, Kathleen. 152 pages, indexed. Arco Books, New York. 1963. Paper, $.95; Cloth, $2.50.

About five years ago, Kathleen Hunter moved from Cornwall to Barcaldine House, Connel, Argyll, Scotland, and she has continued to conduct a seed and nursery business in her new highland home in the Land of the Lorn. Like her predecessor, Eleanour Sinclair Rohde, Miss Hunter is a herb specialist, and it is her intention to devote more time, space, and energy to this particular group of plants. Her little book, *Health Foods and Herbs,* is a truly delightful blend of herbal philosophy, foods, and medicines. Beverley Nichols, in his recent *Garden Open Today* writes: "I don't know Miss Hunter, but her catalogue—which is a sheer delight—suggests so vivid a picture of her . . . please, Miss Hunter, forgive me, if this portrait in any way maligns you. It is really your fault for writing such enchanting catalogues."

SOILS AND FERTILIZERS

PLANT NUTRITION IN AND AROUND THE HOME. Peters, Robert B., Co. 51 pages, illustrated. Robert B. Peters Co., Allentown, Pa. 1963. Paper, $1.50.

A useful little booklet on soils and fertilizers containing interpretations of soil test reports and pH preference tables for over fifteen hundred species of plants.

SOIL FUNGI AND SOIL FERTILITY. Garrett, Stephen D. 165 pages, illustrated, bibliography, indexed. (Commonwealth and International Library of Science, Technology, Engineering and Liberal Studies. Botany Div. Vol. 1) (Pergamon) [dist.] The Macmillan Co., New York. 1963. Paper, $1.95.

A comprehensive introduction to the study of soil fungi by a British authority, with detailed methods for observing the behavior of the microbial community which lives within the soil.

REGIONAL BOOKS

A DICTIONARY OF TREES. Walden, Fred 80 pages, illustrated, indexed. Great Outdoors Publishing Co., St. Petersburg, Fla. 1963. Paper, $1.00.

Florida visitors and residents will find this inexpensive booklet on subtropical trees (native and introduced species) of considerable usefulness. More than one hundred and fifty species are described and illustrated with good line drawings which show the trees as a whole and also give details of leaves, flowers, and fruits.

THE EARLY BREWERIES OF NEW JERSEY. Weiss, Harry B. and Grace M. 98 pages, illustrated, bibliography, indexed. New Jersey Agricultural Society, Trenton, N. J. 1963. Paper, $2.00.

Although this modest little booklet, the tenth of a series of historical monographs devoted to early rural industries of New Jersey, is chiefly concerned with "The Garden State" it does contain an excellent chapter on the ancient art of brewing dating back to the third millenium B.C. in Mesopotamia and also a chapter on some of the early breweries of Philadelphia and New York City.

THE VALLEY: MEADOW, GROVE, AND STREAM. Milne, Lorus J. and Margery. 178 pages, illustrated. Harper and Row. New York. 1963. $4.50.

Here is nature writing of the finest in a setting which is very nostalgic to many—that of New Hampshire's enchanting Oyster River Valley so richly endowed with natural plant and animal life.

THE WILDFLOWERS OF ISLE ROYALE NATIONAL PARK. Janke, Robert A. 85 pages, illustrated, indexed. (Wolf's Eye Vol. 5, Nos. 2 and 3) Isle Royale Natural History Association, Houghton, Mich. 1962. Paper, $1.00.

A handy field guide with line drawings and text for some hundred flowering plants growing within the 200-square-mile area of Isle Royale National Park at Rock Harbor, Michigan.

FLOWER ARRANGEMENT

DECORATIVE WREATHS AND PLAQUES. Aldrich, Dot. 80 pages, illustrated. Great Outdoors Publishing Co., St. Petersburg, Fla. 1963. Paper, $1.50.

Seed pods, grains, nuts, and cones all play an important part in Mrs. Aldrich's fascinating wreaths, sprays, and plaques. Wiring and other techniques are clearly described and illustrated with diagrammatic sketches and photographs.

THE FLOWER ARRANGEMENT CALENDAR: 1964. Wilson, Helen Van Pelt. Unpaged, illustrated. M. Barrows and Co., New York. 1963. Spiral, $1.50.

For eighteen years this attractive engagement-book calendar, with a photograph of a distinctive flower arrangement for each week, has made its appearance. The photographs are selected from the hundreds of entries submitted annually by prize-winning flower arrangers from this country and abroad.

FOR POD HAPPY PEOPLE, THESE DECORATIVE ARRANGEMENTS. Aldrich, Dot. 56 pages, illustrated. Great Outdoors Publishing Co., St. Petersburg, Fla. 1963. Paper, $1.50.

The title of this booklet is quite self-explanatory, since the author deals exclusively with the mechanics of making dried plant arrangements. "Boondoggling" or the art of palm-leaf plaiting is one of its features.

PLANT PHYSIOLOGY, MICROBIOLOGY

THE CONTROL OF CHROMATOPHORES. Fingerman, M. 184 pages, illustrated, bibliography, indexed. (Inter. Series of Monographs on Pure and Applied Biology. Div. Zoology Vol.

14) (Pergamon Press Book) The Macmillan Co., New York. 1963. $7.50.

Although this monograph deals exclusively with the zoological aspects of color changes, nevertheless botanical students who are interested in cytology should find the introductory historical chapter and the extensive bibliography useful.

THE DEVELOPMENT ANATOMY OF ISOETES. Paolillo, Dominick J., Jr. 130 pages, illustrated, bibliography, indexed. (Illinois Biological Monographs No. 31) University of Illinois Press, Urbana, Ill. 1963. Paper, $2.50; Cloth, $3.50.

This study was completed at the University of California at Davis during the tenure of a National Science Foundation Predoctoral Fellowship. With the exception of one plate of *Isoetes braunnii*, all illustrations are of *I. bowellii*. The contents are arranged in the following order: Introduction; Materials and Methods; The General Organization of the Sporophyte; Terminology;; The Shoot; The Root-Producing Meristem; The Apical Meristem of the Root; General Summary and Conclusions; Literature Cited.

EXPERIMENTING WITH THE MICROSCOPE. Krauter, Dieter. 224 pages, illustrated, indexed. Sterling Publishing Co., New York. 1963. $4.95.

The editor of *Mikrokosmos* has written this handbook for the amateur microscopist. It contains simple instructions in the techniques of sectioning, staining, and mounting, with informative chapters on a diversity of subjects including analyses of foodstuffs, stimulants, and a key to the identification of commercial woods.

EXPERIMENTS IN MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY. Seaman, Gerald R. 100 pages, figures, diagrams, bibliographies. Burgess Publishing Co., Minneapolis. 1963. $5.00.

A manual intended for graduate students who need experience with laboratory techniques in microbiological procedures. The extensive list of sources of laboratory supplies and equipment is most valuable.

FATTY ACID METABOLISMS IN MICROORGANISMS. Hofmann, Klaus. 78 pages, figures, tables, bibliographies, indexed. (E. R. Squibb Lectures on Chemistry of Microbial Products, 1962) John Wiley and Sons, New York. 1963. $3.25.

Dr. Hofmann, who is Chairman of the Department of Biochemistry at the University of Pittsburgh, School of Medicine, has used as a basis for this book his lecture on microbial lipid metabolism, which he delivered in 1962 at the Institute of Microbiology, Rutgers, the State University of New Jersey. He has divided the contents into three main sections: Lactobacillus Acid, A Novel Microbial Metabolite; Biosynthesis of Cyclopropane Fatty Acids; and Biosynthesis of Monounsaturated Fatty Acids by Microorganisms.

HANDBOOK OF BOTANICAL DIAGRAMS, 2nd ed. Lloyd, Blodwen. 108 pages, illustrated, indexed. Scholar's Library, New York. 1962. $2.75.

A well-indexed work containing 87 pages of particularly fine botanical sketches, which are designed primarily for use in a one-year course in plant morphology and anatomy at the Royal Technical College in Glasgow. This is a reissue of the edition that was originally published in 1949.

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AN INTRODUCTION TO PLANT PHYSIOLOGY, 6th ed. James, William O. 329 pages, illustrated, bibliography, indexed. Oxford University Press, New York. 1963. $2.80.

A greatly revised edition of a standard British text for senior high school and junior university level. Directions for simple laboratory experiments follow each chapter. Dr. James is the author of the excellent *Background to Gardening* (Pitman, 1957).

SYMBIOTIC ASSOCIATIONS. Nutman, P. S. and Barbara Mosse, eds. 356 pages, illustrated, bibliographies, indexed. (Thirteenth Symposium of the Society for General Microbiology held at the Royal Institution, London, April 1963) Cambridge University Press, New York, 1963. $9.50.

These fifteen papers that were read at the Symposium deal with discussions of the origin, organization, and function of various symbiotic systems which include the integrative and disintegrative factors in symbiotic associations, bacteriophage lysogeny, lichen physiology, legume and non-legume symbiosis, mycorrhizal basidiomycetes, vesicular-arbuscular mycorrhiza, algae and invertebrates, symbiosis and aposymbiosis in anthropods, fungi and ambrosia beetles, *Rumen* bacteria, *Rumen ciliate* protozoa, bacterial associations in germ-free animals, and animals with defined floras, and defence reactions in orchid bulbs.

A TEXTBOOK OF PLANT PHYSIOLOGY, 6th ed. Kochhar, P. L. 357 pages, illustrated, bibliography, indexed. Atma Ram and Sons, Delhi. 1962. $2.50.

Dr. A. C. Joshi, Vice-Chancellor of Punjab University, in the foreword of this work calls attention to the need in India of a book which will provide for a more thorough training of agricultural students in the experimental aspects of plant physiology which, he believes, is the foundation of agronomy. In the concluding paragraph, he writes: "Shri P. L. Kochhar has attempted in this volume to present the fundamentals of plant physiology in simple language that can be easily followed by Indian students. In my opinion, he has achieved considerable success in the task."

CROPS AND PASTURE MANAGEMENT

ALFALFA: BOTANY, CULTIVATION AND UTILIZATION. Bolton, J. L. 474 pages, illustrated (part colored) bibliogrphy, indexed. (World Crops Series) Interscience Publishers, New York. 1962. $14.50.

Dr. Bolton, who is Head of the Crops Section of the Canada Agricultural Research Station at Saskatoon, Saskatchewan, was asked to undertake the writing of this work on worldwide aspects of alfalfa because of his invaluable background of years of experience in agricultural crop research. The contents of this definitive volume follow the general form of

(Continued on page 239)

NEWS, NOTES and COMMENTS

The Art of Wine Growing—from grape to glass—was the latest attraction at The New York Botanical Garden Museum. First-day visitors not only viewed live specimens of California's leading vines and grapes, but sampled some of the state's leading wines. The exhibit celebrated the record grape harvest that took place in California in September and was the first wine festival held at the Garden. It was sponsored by the Garden and the Wine Growers of California.

More than three hundred pounds of grapes, representative of the types most extensively grown in California, were flown from the West Coast for this exhibit. Potted vines, including the Mission variety first planted in the State by the Franciscan Fathers in 1771, were a part of the display.

Varieties of *Vitis vinifera,* grown in Europe and California, were shown with wine-making implements in the Wardian cases in the Museum entrance. The several displays told the story of wine making photographically and also featured a rare collection of corkscrews from medieval times to the present.

Growing interest in the culture of grapes in all parts of the country, both in private gardens and commercially, makes this exhibit especially interesting at this harvest time.

Dr. and Mrs. William C. Steere attended the official opening on September 6, Mrs. Steere cut a grape vine, instead of the customary rope for such an occasion, with pruners.

New York Botanical Garden Awards were presented at the annual banquet of the Botanical Society of America, held in Amherst, Massachusetts, during the meetings of the American Institute of Biological Sciences. Dr. José Cuatrecasas, Research Associate of the Smithsonian Institution in Washington, D. C., and Dr. Richard K. Benjamin, Mycologist at the Rancho Santa Ana Botanical Garden, Claremont, California, were the recipients.

Dr. Cuatrecasas, whose work has taken him from Spain to the Republic of Colombia and the United States, received the Garden's Henry Allan Gleason Award, presented for the first time this year through the gift of Dr. Gleason, Berkeley, California, Head Curator Emeritus of The New York Botanical Garden. The award is based on Dr. Cuatrecasas' work with the *Humiriaceae,* a family of tropical American trees, some of gigantic size. He received a Guggenheim Fellowship in 1951, was with the Chicago Museum of Natural History 1947-50, and until 1939 Director of the Madrid Botanical Garden.

Dr. Benjamin, a native of Argenta, Illinois, has specialized in a group of fungi which live on insects and others which are found in decaying dung. He is a former professor at Claremont Graduate School and a former research fellow at Harvard University.

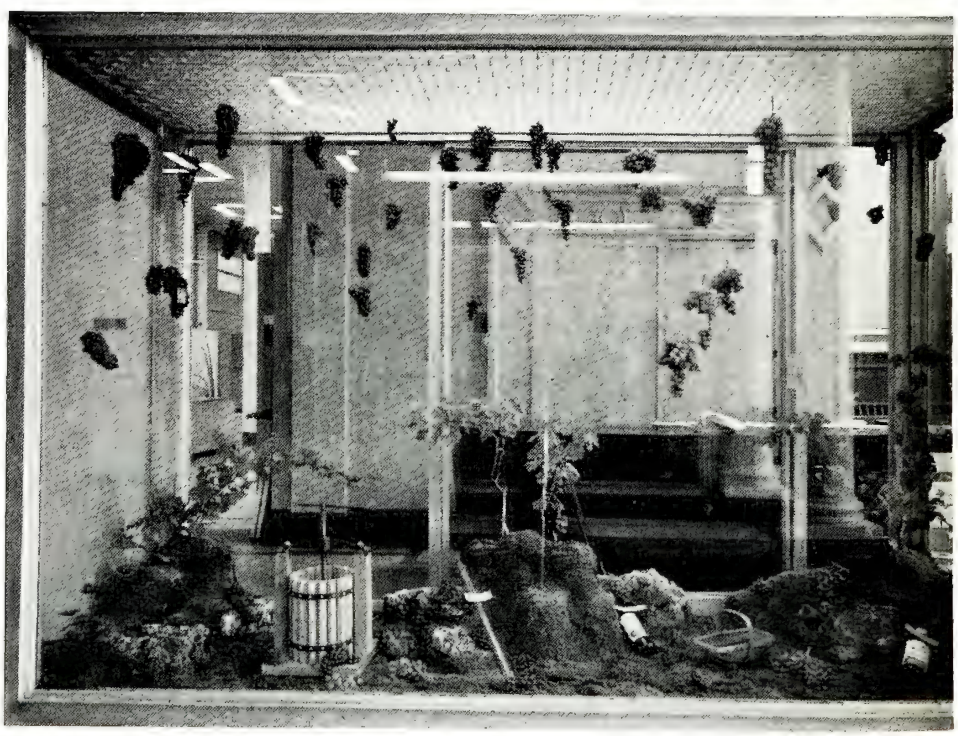
Last year Dr. Roderic B. Park and Dr. Ming G. Pon of the University of California, Berkeley, received The New York Botanical Garden Award for outstanding contribution to the fundamental aspects of botany. Dr. Park and Dr. Ming were the first recipients of this award.

Six Volunteer Associates of The New York Botanical Garden, under Mrs. Leighton H. Coleman, Chairman, have been helping in the Propagating Range. They brought their lunches and worked from ten o'clock in the morning until three o'clock in the afternoon every Wednesday last fall and early winter. Louis H. Politi, the Garden's Horticulturist, was pleased with their accomplishments: 4,230 cuttings of *Euonymus;* 1,420 cuttings of *Hedera helix* 238th St.; 350 cuttings of chrysanthemums prepared and planted; 1,630 *Euonymus* potted; caladium bulbs started in twenty-three flats; ninety-five varieties of seedling ferns transplanted and potted; and seeds of Arboretum material (in ninety-two varieties) sown in flats.

Activities of the Director and Staff. Dr. William C. Steere, Director, returned in late August from field work on the barren reaches of Alaska and Canada bordering on the Arctic Ocean. The expedition was under a program of the Arctic Institute of North America—a private organization with headquarters in Montreal (and a branch office in Washington, D. C.)—and carried out in cooperation with the United States Navy, Office of Research.

Dr. and Mrs. Steere left in late June for the Arctic Research Laboratory at Point Barrow, Alaska. They made trips by plane to the northern slopes of the Brooks Mountains, to Noluck Lake and Cape Thompson in Alaska, Inuvik and Aklavik in the Mackenzie River Delta, and Banks Island in the Arctic Ocean.

Plants in these far northern regions are mostly mosses and other small, ground-hugging species, but because of the warmer waters of the north-moving Mackenzie River, spruce are present in the Mackenzie Delta. An interesting find in the northern foothills of the Brooks Mountains was a moss which Dr. Steere sighted for the first time. Another exciting find was believed to be the first rediscovery of a moss



Above. These photographs tell the story of wine making. The display case contains a rare collection of corkscrews.

Right. Grape vines and bunches of grapes, representative of the types most extensively grown in California, were exhibited in the attractive large Wardian cases in the Museum and Administration Building during September, 1963.

A group from the Federation of the Handicapped visited The New York Botanical Garden as part of its work and recreation program. In charge was the group leader, William Amirault, upper right, who is a student at St. Joseph's Roman Catholic Seminary at Dunwoodie, Yonkers, New York. He was given a helping hand by Arthur Brandeth, New York City patrolman on duty at the Garden.

since it was originally described a century ago from Siberia by a member of the Swedish exploring expeditions to the Lena River. This modest but significant plant was located near Inuvik, a neat and brightly painted village recently built by the Canadian government to replace Aklavik, the old capital of the Mackenzie Delta.

During September and October Dr. Steere attended the first fall meeting of the Cultural Institutions Group, of which he is Chairman for the coming year; a meeting of the Board of Trustees of the Bayard Cutting Arboretum of Oakdale, Long Island; a meeting of the Committee on Style Manual of the Conference of Biological Editors in Washington, D. C.; made a site visit to the University of Alaska at the request of the National Science Foundation; participated in a field trip of the Botany Department of Columbia University to the Delaware Water Gap; addressed the teachers in the In-Service Course, and gave one of the Saturday Afternoon Programs at the Garden, his subject "A Botanist's Summer in the Arctic." In December Dr. Steere will give a talk on "Arctic or Tundra Plants" before the Horticultural Society of New York.

Dr. Pierre Dansereau, Assistant Director (Botany) spent the month of August in research on the vegetation of the Gaspé Peninsula. He participated in the symposium on "Role of Intellectuals in Contemporary Society," presenting a paper on "Contribution of Science and Scientists." The symposium, held under the auspices of the Arts Council of Canada, involved mostly philosophers, social scientists from the University of Montreal and Laval University, and took place at Stanley House in New Richmond, Province of Quebec, August 26-30, 1963. Dr. Dansereau took part in the annual meeting of the New York-New Jersey Section of the Association of American Geographers, held at Rutgers, the State University, in October, 1963, and will contribute to a symposium on functional analysis of vegetation to be held in Cleveland in December, 1963, under the auspices of the American Association for the Advancement of Science.

Dr. Harold William Rickett, Senior Curator of Botany, attended the symposium on the life and works of Michel Adanson at the Hunt Botanical Library. Dr. Rickett also attended several programs of the American Institute of Biological Sciences, at Amherst, Massachusetts, on August 27, 1963, and the banquet of the American Association of Plant Taxonomists. He was a guest of the President and Board of Directors of Girl Scouts of the United States of America at a reception on September 9, 1963, introducing the new design in the Girl Scout Program. He addressed the graduating class of the Children's Gardencraft on "Wild Flowers" at the exercises on September 14 at The New York Botanical Garden, and lectured to the teachers in the In-Service Course on "The Nature and Functions of a Flower" in October. Dr. Rickett participated in the Symposium for Home Gardeners, sponsored by the Pennsylvania Horticultural Society and the Ambler Campus of Temple University, in Philadelphia on October 19. He will lecture in Baltimore on November 15, 1963, on "Medieval Gardens," one of a series of four evening lectures on "Gardens of the Past" being given at the Walters Art Gallery.

Dr. Caroline K. Allen, Research Associate, represented The New York Botanical Garden at the Segundo Congresso, Mexicano de Botánica in San Louis Potosí, S.L.P., September 17-21, 1963. Dr. Allen left the Garden on September 13, for a pre-Congress field trip and will also go on a post-Congress field trip from September 22 to 27. Then she will collect members of the *Lauraceae* in tropical Chiapas until mid-October.

Dr. Richard M. Klein, Alfred H. Caspary Curator, has been elected to a three-year term as Secretary of the Developmental Section of the Botanical Society of America. Dr. Klein attended the meetings of the American Institute of Biological Sciences at Amherst, as did Dr. Alma Barksdale, Senior Research Associate, and Dr. George Bistis, Research Associate. Dr. Barksdale presented a paper on "A New Cross-Conjugating Species of *Achlya*", and Dr. Bistis a paper on "Mating-type and Sex in *Ascobolus spercorarius*".

Robert Jones, Administrative Librarian, attended the seminar on "Conservation of Rare Books, Manuscripts, and Related Subjects," sponsored by the New York Historical Associa-

Mrs. William C. Steere with the prize-winning members of the 1963 graduating class of the Children's Gardencraft. Mrs. Steere presented the certificates and the prizes at the exercises, held on September 14, 1963, at the Garden. Dr. H. W. Rickett, Senior Curator of Botany, addressed the class on "Wild Flowers."

tion at Cooperstown, New York, this past summer, with Harold Tribolet of Chicago and Carolyn Horton of New York; also the meetings of the American Library Association and the Bibliographical Society of America, held in Chicago in July, 1963; and the Adanson Symposium, at the Hunt Botanical Library in August, 1963.

Appointments to the Garden. Three Research Fellows have been added to the Herbarium's staff: Ghillean T. Prance, Ph. D. ,from the Forest Herbarium at the University of Oxford, England, working with the tropical collection; Tetsuo G. Koyama, D.Sc., from the Plant Institute of the Canadian Department of Agriculture, Ottawa; and Shoichi Kawano, Ph. D., from the University of Wisconsin, Madison.

Earl J. McWhorter, Ph. D., on sabbatical leave from the University of Massachusetts, Amherst, will work on the biochemical taxonomy of Basidiomycetes in the Research Laboratory, under a grant from the National Science Foundation; and Hitoshi Takeshita, D.Sc., from the University of Western Ontario, London, Ontario, will be a Research Associate in the Laboratory, working on the chemistry of mold products under a grant from the National Institutes of Health.

Foreign Visitors to the Garden. Many visitors from abroad were welcomed at the Garden during summer 1963. Several were photographed as they toured the buildings or grounds and are shown on these pages. One of the interested visitors was Dr. Ismail Moustafa Ismail, Director General of Parks and Afforestration of Cairo. He was impressed with the use of the Garden by the public, especially the children. He reported that Cairo's parks, public recreation, and playground facilities had been rapidly expanded since the establishment of the United Arab Republic in 1951. Dr. Ismail said that there were only two hundred and seventy acres of parkland in Cairo before 1951 and now there are more than two thousand acres. There were only 11,300 trees prior to 1951; now 90,110 trees are planted in the city's parks and boulevards.

Another interesting, recently completed Cairo project is Pharonek Park, a formal garden laid out in the ancient traditions of the Pharoahs' gardens. This garden contains a fourteen-meter granite obelisk which was found buried in the sands at San El Hager. Arches and pergolas in the park are in the ancient form, and statues have been raised of the Pharoahs best known for their garden enthusiasm. Dr. Ismail observed that Egyptian parks contain more floral color than do those in the United States. He was shown around The New York Botanical Garden by Dr. William C. Steere, T. E. Everett, Louis Politi, Peter Atkinson, Elizabeth Hall, and Phil Clark.

Sixty out of a group of 185 adults, enrolled in the Munich Volkshochschule, who flew by chartered Sabena plane from Munich for a two-week tour of New York, Washington, and Philadelphia, visited The New York Botanical Garden and Fordham University. The Bronx tour, conducted by the Rev. Charles A. O'Neil, Dean of the School of General Studies, Fordham University, included lectures and discussions at Fordham and an afternoon at the Garden.

The Volkshochschule movement in Bavaria and elsewhere in Germany is increasingly popular. The Munich school gives courses to ten thousand students each semester, with night classes mostly on the college level being taken by teachers, professional people, housewives, and others.

Further indication of growing interest in The New York Botanical Garden in foreign capitals was the recent visit of Mrs. Gerd Corall Bryn, noted Swedish journalist and writer, who gathered information for Sweden's first tourist guide to New York. Margot Mertens, well-known German broadcaster and author, recorded for a Voice of America broadcast to East Germany an interview with Mrs. Mary Henry at the Garden, in connection with the veteran botanical explorer's exhibit in the Museum and Administration Building.

Elizabeth Hess, N. D. H., President of Studley College, a famous women's horticultural and agricultural school in the Midlands of England, concluded her American stay with a visit to the Garden on September 18, 1963. She traveled from San Diego to British Columbia on the West Coast, stopping at important horticultural and botanical centers, and from Hamilton Botanical Garden near Toronto down on the East Coast. The stop at The New York Botanical Garden was a climax, she commented, "because it's so amazing to have this wonderful collection of native plants right in the center of New York City's concrete and steel."

Her return trip to England featured a stop at Reykjavik, Iceland, where she visited with a former student, Mrs. Eriks Brand, who is raising tropical fruits in greenhouses heated by hot springs.

"England," said Miss Hess, "has a long tradition of both training and employment of women in horticulture and in agriculture, and this goes back to the end of the last century." Miss Hess has worked with the children's garden of the Brooklyn Botanic Garden, has taught at Ambler Campus of Temple University, Philadelphia, and at Swanley in England, as well as Studley, which was founded by the Countess of Warwick in 1897.

Dr. Ismail Moustafa Ismail

Mme. G. Duprat-Oden'hal visited the Library of The New York Botanical Garden, en route to the symposium honoring Michel Adanson, French botanist and naturalist, at the Hunt Botanical Library in Pittsburgh. Shown with Mme. Duprat, Chief Librarian of the Muséum National d'Historie Naturelle of Paris, is Miss Elizabeth C. Hall, Sarah Gildersleeve Fife Research Librarian at the Garden, and Dr. Pierre Dansereau, Assistant Director (Botany).

Maria Ingeborg Mattick, a visitor from Germany, admires tomatoes in the children's gardens at The New York Botanical Garden. One hundred and eighty youngsters, aged nine to sixteen, cultivated their own plots this past summer. Miss Mattick, a specialist in child training, was also impressed by the children's nature books in the Garden's Library. "They lend themselves to teaching English, and at the same time supply an introduction to the elementary terms of biology," she remarked. Her father, Dr. Fritz Mattick, Director of the Botanical Garden in West Berlin, found useful ideas at The New York Botanical Garden during a trip to this country in 1959, and "stressed that it was an important place to see," Miss Mattick added. At left is Lillian Weber, an instructor in the Garden's Educational Program.

Visitors to the Garden. Within recent months the Garden has welcomed the following visitors.

Dr. Emilio Arigoni, Zurich, Switzerland.

Dr. M. Diaz-Piferrer, Institute Biological Marina, University of Puerto Rico.

Dr. and Mrs. Joseph Kuc, Purdue University, Lafayette, Ind.

Dr. Geneva Sayre, Russell Sage College, Troy, N. Y.

Dr. Hugh Cutler, Missouri Botanical Garden, St. Louis, Mo.

Dr. F. R. Uyenco, University of the Philippines, Diliman, Rizal.

Dr. R. K. Godfrey and R. Houk, Department of Botany, Florida State University, Tallahassee.

Dr. B. L. Turner, Director, University of Texas Herbarium, Austin.

Dr. George J. Goodman, University of Oklahoma, Norman.

Don W. Wemple, Department of Botany, Iowa State University, Ames.

Dr. Grady L. Webster, Department of Botany, Purdue University, Lafayette, Ind.

Richard C. Keating, Department of Botany, University of Cincinnati, Cincinnati.

Dr. Robert H. Mohlenbrock, Department of Botany, Southern Illinois University, Carbondale.

Dr. R. N. Kapil, Department of Botany, University of Delhi, India.

Dr. E. Yale Dawson, Hancock Foundation, University of Southern California, Los Angeles.

Dr. Jacques S. Zaneveld, Norfolk, Va.

Dr. Harvey Miller, Miami University, Oxford, Ohio.

Irwin Brodo, Michigan State University, East Lansing.

Dr. Marie L. Farr, National Fungus Collections, Beltsville, Md.

Dr. Dorothy I. Fennell, University of Wisconsin, Madison.

Dr. Richard T. Hanlin, Georgia Experiment Station, Athens.

Dr. Charles L. Kramer, Kansas State University, Manhattan.

Donald P. Limber, Hoboken, N. J.

Gene E. Michaels, University of Georgia, Athens.

Dr. K. M. Safeeulla, Washington State University, Pullman.

A. C. Stoll, Central Bureau voor Schimmelcultures, Baarn, The Netherlands.

Dr. Tom van der Zwet, U. S. Tung Research Laboratory, Bogalusa, La.

Dr. Arthur L. Welden, Tulane University, New Orleans.

Prof. and Mrs. O. Harriott, Kingston, Jamaica.

Dr. P. N. Patel, University of Wisconsin, Madison.

Dr. Robert Costello

Dr. Takeshi Seno

39 high school students attending the Theodore Roosevelt High School Summer Science Seminar.

Dr. Gerald B. Ownbey, Department of Botany, University of Minnesota, Minneapolis.

Thomas M. Pullen, Department of Botany, University of Georgia, Athens, Ga.

Dr. Aaron J. Sharp, and William H. Ellis, Department of Botany, University of Tennessee, Knoxville.

B. A. Krukoff, Central American Manager, Experimental Plantation, Inc., Finca El Naranjo, Chicacao-Such, Guatemala, C. A.

E. R. Thorp, Curator of the Durken, East Natal Botanical Gardens, is shown during a tour of the Museum and Administration Building with Mrs. Wilfred M. Kluss, of Mamaroneck, New York. Mrs. Kluss, whose husband attended school with Mr. Thorp in England, is a member of The New York Botanical Garden. Mr. Thorp visited a number of botanical gardens and arboretums in the United States on his way to the Fourth World Orchid Congress held in Singapore, October 3-10, 1963.

N. Ben-Haim, an Israel editor and author of children's books, came to this country to study popular presentations of the sciences. He found the children's nature book collection in the Garden's Library very helpful. Here Mr. Ben-Haim is discussing the Mexican prickly pear with Phil Clark, Assistant to the Director (Public Relations), while walking through the Cactus and Succulent House of the Conservatory Range. The native Israeli is called "sabra" or cactus, Mr. Ben-Haim said, because like the cactus, which grows widely in Israel, he is tough and resistant.

Mr. Ben-Haim is well known as co-editor of *Views of the Biblical World*, published in Israel.

Dr. Richard S. Cowan, Assistant Director, Museum of Natural History, Washington, D. C.

Dr. Fumio Maekawa, Department of Botany, Faculty of Science, University of Tokyo, Japan.

William Isaacs, Department of Botany, University of Michigan, Ann Arbor, Mich.

Philip M. D. Martin, Department of Botany, University of California, Los Angeles.

Dr. Shirley Tucker, Biology Department, Northwestern University, Evanston, Ill.

Dr. John J. Wurdack, Department of Botany, U. S. National Museum, Washington, D. C.

Dr. Otto Solbrig, Gray Herbarium, Harvard University, Cambridge, Mass.

Kenneth B. Hoover, Messiah College, Grantham, Pa.

Barbara Briggs, National Herbarium of New South Wales, Sydney, Australia.

Dr. Kingsley R. Stern, Chico State College, Chico, Calif.

Dr. M. Johnson, University of Wisconsin, Madison.

An Adanson Bicentennial Symposium was held August 18 and 19, 1963, at the Hunt Botanical Library, Carnegie Institute of Technology, Pittsburgh, Pennsylvania. It commemorated the publication of Michel Adanson's *Familles des Plantes*, in which he established the idea of family as a category in plant and animal classification, and for the first time assigned all known genera of plants to families of his own scheme.

Michel Adanson (17 27-1806) was a pupil of Bernard de Jussieu and a contemporary of Linnaeus, and a member of the Franch Académie des Sciences. He spent four years (1749-54) in Senegal, where he was the first naturalist to

study a tropical flora and fauna in detail. He was also one of the first to make observations on the interaction of biological units on populations.

In March, 1961, Adanson's botanical books, manuscripts, notes, and correspondence were acquired for the Hunt Botanical Library. The collection includes publications by Linnaeus and other contemporaries, a nearly-complete manuscript for a second edition of *Familles des Plantes,* and more than fourteen thousand supporting manuscripts. These items have been cataloged by the Hunt Botanical Library staff, and studies are being prepared on some of them.

A Comité International, with headquarters in France, is responsible for stimulating interest in honoring Adanson with several functions; that in Pittsburgh was the principal one held in America. Members of this Comité are: M. le Ministre André Malraux, *Président d'Honneur;* Dr. Roger de Vilmorin, Président, Société d'Horticulture, *Président;* Prof. Roger Heim. Directeur Muséum National d'Histoire Naturelle and Président Académie des Sciences, *Vice Président;* Dr. Frederick Seitz, President United States National Academy of Science, *Vice Président;* and Jean-Paul Nicolas, Hunt Fellow, Hunt Botanical Library, *Sécrétaire.* With the exception of M. Malraux, all of the members of the Comité attended and took part in the program. In addition, about one-hundred guests, including many distinguished scholars, from several foreign countries and twenty American states attended.

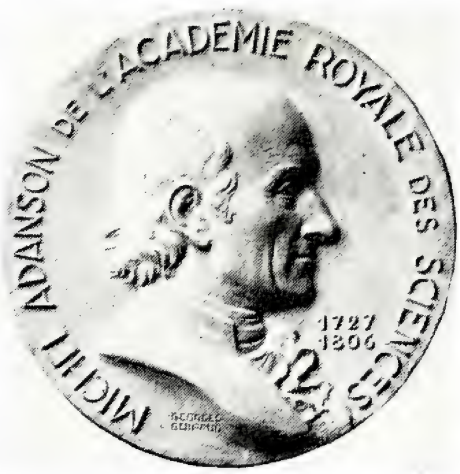
The first session on August 18 with Dr. George H. M. Lawrence, Director of the Hunt Botanical Library, presiding was: "Adanson, the Man" by Jean-Paul Nicolas; "Adanson and the *Familles des Plantes*" by Dr. Frans A. Stafleu, Botanical Museum, Utrecht; and "The Hunt Collection of Adanson's Botanical Library and Manuscripts" by Willem D. Margadant, Assistant Librarian, Hunt Botanical Library.

After the program a buffet dinner was held for all guests and registrants.

On August 19, after lunch for all participants, a second session was held with Dr. Roger D. Vilmorin presiding. The program was: "Adanson's Plan for Tropical Development" by Jean-Paul Nicolas; "Les Dessinateurs d'Histoire Naturelle en France au XVIIIe Siècle" by Mme. G. Duprat, Conservateur en Chef de la Bibliothèque Centrale du Muséum National d'Histoire Naturelle, Paris; "Mathematics and Classification, from Adanson to the Present" by Dr. Peter H. A. Sneath, Medical Research Council, London; and "Adanson in Retrospect" by Prof. Théodore Monod, Director du Laboratoire des Pêches d'Outre-Mer, Muséum National d'Histoire Naturelle, Paris, Directeur de l' Institut Français d'Afrique Noire, Université de Dakar, Senegal.

During the two-day program selections from Adanson's botanical library and papers were interestingly displayed. Specimens of plants and fish collected by Adanson; drawings, plans, and flowering and fruiting specimens of the baobab tree *(Adansonia digitata),* sent from Dakar; the only portrait of Adanson known to have been painted from life, and medals in his honor were also shown.

The symposium, besides honoring Adanson, served as an introduction to the Hunt Botanical Library, its resources and its program. The



atmosphere was one of friendly informality, with the programs and library hours so arranged that all participants had an adequate opportunity to enjoy the treasures.

The first part of the symposium has been published as Number I of the Hunt Monograph Series and is titled *Adanson; the Bicentennial of Michel Adanson's 'Familles des plantes'.* It contains a detailed catalog of the Hunt's collection of Adansoniana. It maintains the high bibliographical and typographical standard set by all previous Hunt publications.

On Monday evening, August 19, there was a banquet program. Each table was decorated with a seedling plant of *Adansonia digitata.* The principal address, "Franco-American Activities in Botany," was given by Dr. Roger de Vilmorin, Past-Président Académie d'Agriculture de France, President International Commission for the Nomenclature and Registration of Cultivated Plants. At the conclusion of the program, each participant was presented with the symposium volume and a medal struck in France in honor of Adanson.

Attending from The New York Botanical Garden were Dr. Caroline K. Allen, Dr. Arthur Cronquist, Robert Jones, and Dr. H. W. Rickett.

Dahlia 'Dr. P. P. Pirone', named in honor of the Garden's Senior Plant Pathologist and introduced by Albert Parrella, well-known dahlia grower, was awarded a blue ribbon at the Connecticut Dahlia Society Flower Show, August 24, 1963.

In the Adirondacks (Continued from page 225)

of fir cones at higher altitudes in the Virginia-West Virginia territory. Because of this information, I had a desire to ascend Hawksbill Mountain, whose summit at slightly more than four thousand feet is the highest point in the Park. Scattered over the summit and in isolated spots along the ascending trail near the peak were cone-bearing fir trees. My comments and curiosity about them induced Mrs. Bausor, if I recall correctly, to display her athletic prowess by suddenly ascending one of the stunted trees on that exposed site and obtaining a cone. Much to my delight, it displayed bracts not any longer than the scales which they subtended, but with tips which were recurved over the next lower scales. In thus being recurved and visible, these bracts differed from those of the northern balsam fir *(Abies balsamea)* in which the bracts are typically not at all visible; and in not being conspicuously longer than the scales which they subtended, they differed from those of the southern balsam fir *(Abies fraseri)* which also prevails on the Blue Ridge as well as on Mount Mitchell, in the Great Smokies and elsewhere in the higher southern Appalachians, and in which the bracts protrude very prominently. On the basis of the Hawksbill Mountain fir cone, obtained as the result of stopping for a traffic light in Washington, and on the basis of the already mentioned reports of aberrant fir cones, I had the audacity, in 1936, to propose a new species, *Abies intermedia,* a brief description of which was published in the Journal of the Southern Appalachian Botanical Club. This periodical was selected for my only taxonomic venture not merely because of the territorial association, but also because the editor, Dr. E. L. Core of West Virginia University, had been a graduate student colleague of mine at The New York Botanical Garden and in 1934 had published drawings of cone scales, bracts, and seeds of *A. balsamea* from Vermont, of *A. fraseri* from North Carolina, and of a West Virginia form. Concerning their taxonomic relationship, he commented only that the West Virginia trees "may represent a distinct species, possibly derived by hybridization" of the other two. That statement and the reluctance on his part as well as on that of others, who had observed the aberrant cones, to assign specific value to them, finally induced the temerity on my part to burst into print.

It was to this venture that Dr. Jablonski referred when introducing me so cordially to Dr. Phelps, and the resultant sudden display of a fir cone with exserted bracts provided me four days of inner pleasure in believing that through the intercession of an Adirondack chipmunk or squirrel, the botanical enthusiasm of a retired physician, and the fortuitous presence of a forestry college professor, a specimen had been found of my Blue Ridge taxonomic brainchild, five hundred miles from its type locality. Not until I returned to the Garden and examined my account of *Abies intermedia* for the first time after twenty-seven years, did I recall that the cone bracts of this *species novum* were recurved, whereas those of Dr. Phelps' find were straight, and that the trees to which Professor Ketchledge had referred, and of which a cone had been found in the Heart Lake area of the Adirondacks, were none other than *A. balseamea* var. *phanerolepis,* which famous Professor Fernald had found and described fifty-four years ago. To add to the deflation provided by this conclusion is the statement by Dr. Gleason, in his monumental revision of the Illustrated Flora, that var. *phanerolepis* occurs in many parts of the range of *A. balsamea,* and in some districts is predominant.

The moral of this tale is that caution should always precede expressions of opinion and that "Pride Goeth Before A Fall."

To complete this series of peculiar coincidences, I must tell the readers that when Dr. Fulling was recounting them to me the first time, I could hardly wait for him to finish. For I was holding in my hands a manuscript—that of "Mosses of Lawn and Garden"—by the same Dr. Ketchledge who figured in these coincidences!—The Editor.

"HOW WAS YOUR VACATION?"

By HAROLD WILLIAM RICKETT

—That's the question I was most frequently asked the past few weeks. Well, here's the answer.

I drove 10,600 miles through midwestern and western states. I visited colleagues and enlisted collaborators for our Wild Flower Books in Missouri, Colorado, Arizona, California and Oregon. (I meant to take in Washington, Minnesota, and Wisconsin, but got behind schedule.)

I spent three days in the Indian Peaks region of Colorado, going with Delbert Wiens in his jeep up to 12,500 feet (and on foot a few hundred feet higher): a wonderful alpine garden in which I made about a hundred photos.

I climbed Mt. Baldy ((11,600 feet) in the White Mountains of Arizona.

I explored Sycamore Cañon in southern Arizona with Charles Mason of the University of Arizona and Leslie Goodding, who discovered many rare endemics in the cañon and for whom a number have been named. Mr. Goodding is still active in such pursuits in spite of his eighty-three years, and injuries received in a recent accident.

I spent a day in San Diego at the Natural History Museum, visited Torrey Pines State Park, and saw Philip Munz at the Rancho Santa Ana which is devoted to native California plants.

I spent three days at the University of California in Los Angeles, inspecting a large collection of color transparencies of California wild flowers; Harlan Lewis was my host. I also examined the great Webber collection of similar photographs in the California Academy of Sciences in California, where I had the help of J. T. Howell and Elizabeth McClintock.

I talked briefly with Kenton Chambers of the State University of Oregon at Corvallis.

I spent three days on Mt. Rainier, one of them in photographing flowers in the fabulous alpine gardens between six thousand and seven thousand feet elevation.

In all, I made some seven hundred and fifty exposures, mainly of flowers, perhaps four hundred species.

I also squeezed in ten days of pure loafing—vacation—in Carmel where I have old friends.

Dr. Rickett, Senior Curator of Botany, is engaged in the preparation of the five-volume series on the Wild Flowers of the United States to be published by The New York Botanical Garden.—The Editor.

RECENT BOOKS (Continued from page 233)

organization of other monographs in the World Crops Books series—origin and history, distribution and production, botany, classification, breeding, culture, harvesting, chemical composition, and uses. There is a useful tabulation of institutions that are carrying on important alfalfa research (twenty-one countries are represented).

CUCURBITS: BOTANY, CULTIVATION, AND UTILIZATION. Whitaker, Thomas W., and Glen N. Davis. 250 pages, illustrated (colored front.), bibliography, indexed. (World Crops Books) Interscience Publishers, New York. 1962. $11.50.

Another comprehensive reference work in the authoritative World Crops Books series. The *Cucurbitaceae* furnish many important crops, including food, fiber, and, in the case of some of the gourds, a variety of vessels and containers. The extensive bibliography is a noteworthy feature.

THE GROWING OF SUGAR CANE. Humbert, Roger P. 710 pages, illustrated (part colored), bibliography, indexed. American Elsevier Publishing Co., New York. 1963. $29.00.

Another definitive work on one of the world's major food crops by a leading authority in the field of sugar research. In this up-to-date text the many factors relating to sugar growing are described and discussed—botany, soils and fertilizers, climate, seeding, planting, irrigation, drainage, weed control, ripening, harvesting, pests and diseases, storage, and transportation.

PASTURE AND RANGE RESEARCH TECHNIQUES. 242 pages, illustrated, bibliography. Comstock Publishing Associates, Ithaca, N. Y. 1962. $5.00.

This series of thirty-two papers has been prepared by a joint committee of the American Society of Agronomy, American Dairy Science Association, American Society of Animal Production, and American Society of Range Management. The six main divisions of the contents are: Experimental Pastures and Their Management; Experimental Animals and Their Management; Determination of Herbage Quality; Determination of Herbage Production and Yield; Study of Pasture Flora and Complementary Factors.

SISAL: TWENTY-FIVE YEARS' SISAL RESEARCH. Lock, G. W. 355 pages, illustrated, bibliographies, indexed. (Tropical Science Series) John Wiley and Sons, New York. 1962. $10.50.

The growing of sisal is an important industry in East Africa, and it was at the request of The Tanganyika Sisal Growers' Association that G. W. Lock, who was in charge of the Sisal Research Station at Mlingano, Tanganyika, for twenty-five years, wrote this comprehensive survey of sisal in all its aspects. The contents include the history and development of the industry, the nomenclature and taxonomy of the sisal plant and other fiber agaves, cultural techniques, breeding programs and fiber preparation, and marketing.

YOUNGER READERS

BECAUSE OF A TREE. Milne, Lorus J. and Margery. 149 pages, illustrated, bibliography. Atheneum, New York. 1963. $3.95.

To Dr. and Mrs. Milne, "Any tree is far more than just a woody plant. It is a center of attraction for many kinds of life." These two

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author-naturalists have selected several trees—apple, sugar maple, spruce, fir, palm, bald cypress, redwood, aspen, and saguaro cactus (which is often called a desert tree) and have vividly described the plant and animal community that is associated with each tree. Ten-year olds and up will enjoy this.

CAREERS IN THE BIOLOGICAL SCIENCES. Fox, William W. 114 pages, illustrated, bibliography, indexed. (Careers for Tomorrow) Henry Z. Walck, New York. 1963. $3.50.

This authoritative vocational guide for high school and college students offers basic information on many professions in the field of biology, in which the plant sciences are well represented.

THE COMMUNITY OF LIVING THINGS. Ress, Etta S., Editor in Chief. Volumes I-V. Creative Educational Society, Mankato, Minn. 1956-1960. $43.50.

Vol. I: Field and Meadow by Etta S. Ress; Vol. II Fresh and Salt Water by B. Bartram Cadbury; Vol. III: City Parks and Home Gardens by Robert S. Lemmon; Vol. IV: Forest and Woodland by Stephen Collins; Vol. V: The Desert by Alexander B. Klots and Elsie Klots. This attractive series of books is published in cooperation with the National Audubon Society. Each of the five volumes contains full-page picture-stories with easily readable, entertaining, and informative texts on the flora and fauna of a specific biological community. The well-chosen contributors have produced a set of books of high quality which can be recommended for the children's library shelf.

THE EARTH'S STORY. Ames, Gerald and Rose Wyler. 224 pages, illustrated, indexed. (Creative Science Series) Creative Educational Society, Mankato, Minn. 1962. $4.95.

One of the Creative Science Series, published in cooperation with The American Museum of Natural History. The splendid illustrations and simple text combine to make this an excellent introduction to geology and paleontology for young people.

THE INSECT WORLD. Pallister, John. 56 pages, illustrated (part colored), indexed. (Finding Out Books) Home Library Press, New York. 1963. $2.95.

Do you realize that there are over fifteen hundred different species of insects in the average backyard? Some of the more common ones are here described and pictured in vivid colors. There is no need to journey to foreign lands in search of the great unknown because, with the help of this authoritative guide book, you can make thrilling discoveries right in your own home garden. John Pallister recently appeared on one of the Saturday Afternoon Lecture programs at The New York Botanical Garden.

INSECTS ARE WHERE YOU FIND THEM. Tee-Van, Helen Damrosch. 76 pages, illustrated, indexed. Alfred A. Knopf, New York. 1963. $2.95.

There is a charm to this book which will appeal to many older readers as well as to the younger ones for whom it was written. The illustrations, type, and general format are exceptionally fine. A delightful piece of work by a talented author-illustrator.

JUNIOR FLOWER SHOWS: A COMPLETE GUIDE TO THE PLANNING, STAGING, AND JUDGING OF CHILDREN'S FLOWER SHOWS. Cutler, Katherine N. 145 pages, indexed. M. Barrows and Co., New York. 1963. $3.50.

The author of this very excellent manual was a pioneer in Junior Garden Clubwork and in organizing Junior Flower Shows, first in New Jersey and then throughout the country. There is much information which will be helpful to flower show chairmen and leaders of junior groups. Conservationists will welcome the inclusion of lists of plants (for Northeastern, southeastern, and western regions). which should be preserved.

LOOK AT A FLOWER. Dowden, Anne Ophelia Todd. 120 pages, illustrated, indexed. Thomas Y. Crowell Co., New York. 1963. $4.50.

Numerous illustrations of flowers and plants with the signature of Anne Ophelia Todd have appeared in *Life, House Beautiful,* and *Natural History.* This talented botanical artist, who has been head of the Art Department of Manhattanville College for over twenty years, has now written and illustrated her own book entitled *Look at a Flower,* which truly reflects perfection as to format, layout, reproduction, and clarity of text. This charming introductory botany, although classified by the publisher under Juvenile Books, should find an enthusiastic reception from older readers who are searching for an authoritative but not complex guide to floral morphology.

Please note that Book Service can accept orders only for books priced at more than one dollar because of publishers' regulations and requirements.

WILD FLOWERS AND TREES

HOW TO KNOW THE WILD FLOWERS: A GUIDE TO THE NAMES, HAUNTS, AND HABITS OF OUR COMMON WILD FLOWERS. [Parsons], Mrs. William Star Dana. Rev. ed. by Clarence J. Hylander. 418 pages, illustrated, indexed. Dover Publications, New York. 1963. Paper, $1.85.

The reappearance of Mrs. Dana's *How To Know the Wild Flowers* in a sturdy, inexpensive, paperback edition is joyful news. Several generations of children learned to recognize the common flowers of the countryside with the help of this beloved classic. Many popular wild flower manuals have been written since the first edition of Mrs. Dana's book appeared in 1893, but few have offered such charming, illuminating, and entertaining facts about each flower—how it got its vernacular name, what its Latin name means, its legends, and its uses. Interspersed throughout the text are quotations from our American poets and essayists who loved these flowers—Bryant, Emerson, Longfellow, Thoreau, and Burroughs. In this new Dover edition, with a complete updating of botanical nomenclature to conform with the eighth edition of *Gray's Manual of Botany,* are 174 of the original, finely detailed line drawings which many of us in the past used to color as we discovered each new flower.

TREES. Zulver, Selma. 93 pages, colored illustrations, indexed. (Vest Pocket Nature Guides) Ottenheimer Publishers, Baltimore, 1963. Paper, $.49; Cloth, $1.00.

Eighty trees from many regions of the United States pictured in color, with good descriptive text, and in a vest-pocket size edition

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Dorothy E. Hansell, Editor

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Editor

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Wild Flowers ins. bk. cov. Nov.-Dec.

WILD FLOWERS. Zulver, Selma. 94 pages, colored illustrations, indexed. (Vest Pocket Nature Guides) Ottenheimer Publishers, Baltimore. 1963. Paper, $.49; Cloth, $1.00.

A companion title to *Trees* with pictures and detailed descriptions of eighty wild flowers, most of which are native to northeastern United States.

NATURAL HISTORY

ERNEST THOMPSON SETON'S AMERICA, edited with an introduction by Farida A. Wiley, with contributions by Julia M. Seton. 367 pages, illustrated, bibliography, indexed. (A Dolphin Book) Doubleday and Co., Garden City, N. Y. 1963. Paper, $1.45.

Ernest Thompson Seton, one of America's beloved naturalists, was a master nature-story teller who illustrated his books with his own splendid drawings. To Farida Wiley, his devoted friend of many years and to his widow, Julia Seton, we are indebted for this choice selection of Mr. Seton's best writings and for the delightful biographical and reminiscent notes.

WASP FARM. Evans, Howard E. 178 pages, illustrated, bibliography, indexed. The Natural History Press, Garden City, N. Y. 1963. $3.95.

Dr. Evans, who is Associate Curator of Insects at The Museum of Comparative Zoology at Harvard University, has devoted many years to an intensive study of wasps. In this present volume he presents a readable, popular account of these remarkable members of the *Hymenoptera.* Those who enjoy the writings of Edwin Way Teale will find good reading in *Wasp Farm.*

OTHER BOOK REVIEWS

THE NEW FIELD BOOK OF AMERICAN WILD FLOWERS. Rickett, Harold William. 414 pages, illustrated (many in color), indexed. G. P. Putnam's Sons, New York. 1963. $4.95.

This book brings out clearly the remarkable versatility of its author, a distinguished botanist who, in addition to his well-known ability to express scientific concepts in plain non-technical English, has also demonstrated here his talents as an artist and photographer. The advantages of having drawings and photographs by an author are many, as he, better than anyone else, can illustrate exactly those points he emphasizes in the text, and he can thus bring about harmony between text and design. Although the drawings are perhaps not as eye-appealing as those in preceding editions of *The Field Book of American Wild Flowers* by Schuyler Matthews and others, because of the lack of shading, they are far more functional, in being more accurate and more detailed—and many more kinds of plants are illustrated. In the plates made from Dr. Rickett's fine color photographs, the reader will recognize many of his more puzzling friends of field and forest, even before reaching the text. In fact, the user of this book should be able to identify most of the plants he finds by a tour of the illustrations. He can then refer to the concise text which, though not written in popular style, is concise and to the point for confirmation of his choice.

From some five thousand species of flowering plants which occur in the geographical area covered by his book, Dr. Rickett has selected 980 for inclusion as wild flowers presented in order of family under the two great divisions, monocots and dicots. The commentary on each plant consists largely of helpful information about it and of suggestions on how to distinguish it most easily from others with which it might be confused. Synoptic "guides" to the families and to genera within larger families, supplemented by a section on "shortcuts to identification," will enable amateurs to identify those plants not found among the photographs or drawings. The illustrated glossary is a welcome innovation, as it will facilitate the understanding and the use of unavoidable technical terms. Although slightly larger than the earlier addition, this book is still a convenient size for the pocket, the handbag, or the automobile glove compartment.

This seems to be a highly appropriate occasion to point out that Dr. Rickett, already the author of another and earlier book on wild flowers, has embarked upon the monumental task of writing a series of five books on the wild flowers of the United States, region by region, to be sumptuously illustrated, largely with full-color photographs. This series of definitive books will be published by The New York Botanical Garden, thanks to funds raised by a national committee headed by Mrs. David Rockefeller. Dr. Rickett has already made substantial progress with the first volume which will cover the wild flowers of the northeastern United States and will, we hope, appear some time next year.

W. C. Steere

ROADSIDE FLOWERS OF ALASKA. Potter, Louise. 590 pages, illustrated, indexed. Louise Potter, Thetford Center, Vt. 1962. $7.00 cloth, $6.00 paper.

The author has produced a useful and usable work on the handsome wild flowers, more than two hundred and fifty species of herbs and shrubs, that grace Alaskan roadsides. In spite of the short growing season in the more continental parts of the State, the long summer days stimulate the development of fine displays of wild flowers. In general, the line drawings are accurate and well represent the appearance of the plants. The few exceptions to this generality include *Chrysosplenium tetrandrum* (page 116) and *Lagotis glauca* (page 224), whose personalities have not been accurately rendered. The inclusion of a scale or of a fraction indicating the degree of enlargement or reduction would be helpful. The lists of plants of various areas, with the observed date of flowering, will undoubtedly stimulate a much greater interest in —and knowledge of—Alaskan plants by Alaskans and by visitors alike.

W. C. Steere

SERTUM ANGLICUM. L'Héritier de Brutelle, C.-L. Facsimile with Critical Studies and a Translation. Hunt Botanical Library, 1963. $10.00.

The *Sertum Anglicum,* a chaplet of flowers dedicated by L'Héritier to the botanists of England in recognition of their hospitality during the years 1786-7, is a bibliographical rarity, and a fitting choice to introduce a series of facsimile reprints planned by the Hunt Botanical Library. This book far transcends a simple reproduction. The original Sertum is a slim volume comprising 36 pages of text with 34 plates. We have it now bound in with nearly 90 pages of introductory and explanatory matter, and it is the commentary as much as the treatise itself which (as with the Ray Society's recent *Species Plantarum,* 1957-9) will attract and hold the interest of botanists. This introduction consists of four parts. A biographical memoir (31 pages, a model of its kind) by F. A. Stafleu pictures L'Héritier as an enlightened jurist but enigmatic character who as a self-taught amateur and ardent Linnaean partisan found himself repeatedly at odds with the botanical establishment dominant in Paris, a brilliant group of professionals committed to a search for a natural system of classification. L'Héritier's flight to England with the Dombey collection and its bearing on the genesis and title of *Sertum Anglicum* are followed up in detail; and light is thrown on the author's other publications, all rare and obscure works. Three English botanists, headed by J. L. S. Gilmour, contribute a section (15 pages) on the nomenclature and identity of the species mentioned in the Sertum, and add valuable notes on the present whereabouts of L'Héritier's types and on the collectors through whose efforts the plants had been introduced to cultivation in Europe. Wilfred Blunt offers an interesting memoir (4 pages) on the artists employed by L'Héritier—two of them, James Sowerby and Pierre-Joseph Redouté, destined later to reach a pinnacle of fame in their profession. A translation of the text by a committee of Benedictine Latinists, headed by Fr. Maximilian Duman (23 pages) will be widely acclaimed. The whole volume is introduced by an editorial foreword from G. H. M. Lawrence who is to be congratulated on organizing and producing a work of international scholarship. The book was handsomely manufactured in Holland, and at the low price is a rare bargain.

R. C. Barneby

MOSSES OF FLORIDA: AN ILLUSTRATED MANUAL. Breen, Ruth Schornherst. 273 pages, illustrated, indexed. University of Florida Press, Gainesville. 1963. $8.50.

The result of over thirty years' study, this excellent manual is an original and authoritative contribution to bryological literature. Dr. Breen has lived year-round in Florida during most of these years, and her wide knowledge of the moss flora is based on extensive collecting and on seasonal field studies conducted throughout the state over this long period.

Preliminary sections of the book are devoted to "Summaries of Family Characters" and a "Key to Genera." The key in particular, which is based largely on vegetative characteristics since many of the Florida mosses produce sporophytes rarely or not at all, is a model of clarity and convenience for use. The main part of the manual is concerned with a taxonomic treatment of all mosses known to occur in Florida, with notes on habitat and distribution. Dr. Breen has taken great pains to provide concise and clearly written descriptions. The final part, and one of the main attractions of the volume, is the fine series of carefully prepared illustrations by the author of virtually all species described. This book will unquestionably remain for many years to come the standard reference for the mosses of Florida and the southeastern states.

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